OPTOSERVER USER'S GUIDE

Form 722-050111—JANUARY, 2005

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OptoServer User's Guide
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Welcome to OptoServer

OptoServer™ is Opto 22's OPC 1.0-compliant, DDE, and NetDDE server for Microsoft® Windows® systems. Part of the Opto 22 FactoryFloor® suite of software. OptoServer is the client-server application that supports the bidirectional flow of data between PC clients on the FactoryFloor network and controllers on the Opto 22 controller network.

OptoServer works seamlessly with OptoDisplay™ and OptoControl™ as stand-alone applications or within a complex client-server architecture. OptoServer can also be used to integrate Opto 22 control hardware and software solutions with Microsoft products, third-party packages, and custom applications you can create using development tools such as Microsoft Visual Basic® or Visual C++®.

About This Guide

This guide assumes that you are already familiar with Microsoft Windows on your personal computer, including how to use a mouse, standard commands, and menu items to open, save, and close files. If you are not familiar with Windows or your PC, refer to the documentation from Microsoft and your computer manufacturer.

This guide also assumes that you are familiar with Dynamic Data Exchange (DDE) and OLE for Process Control (OPC) if you choose to use OptoServer with DDE-aware and OPC-compliant clients. For information on DDE, consult www.microsoft.com/dev. To learn about OPC, contact the OPC Foundation at www.opcfoundation.org.

Here's what is in this user's guide:

Chapter 1: Quick Start—Two quick demonstrations: how to set up OptoServer to run with an OptoDisplay client and to run with a DDE-aware client.

Chapter 2: What Is OptoServer?—Overview of what OptoServer does and its value to your system, as well as client/server basics.

Chapter 3: OptoServer and DDE-Aware Clients—Details of message transactions between DDE-aware applications and how to use OptoServer with sample programs for Microsoft Visual Basic.

Chapter 4: OptoServer and OPC—Overview of OPC and how to use OptoServer with a sample OPC client.

Appendix A: OptoServer Troubleshooting—Tips for resolving problems you may encounter while running OptoServer.

Appendix B: OptoServer Files—A list of OptoServer files in the OptoServer directory.

OptoServer Index—Alphabetical list of key words and the pages they are located on.

A master **FactoryFloor Glossary**, which defines terms used in the FactoryFloor suite of products, is located at the back of this binder.

Document Conventions

The following conventions are used in this document:

- Italic typeface indicates emphasis and is used for book titles. (Example: "See the *OptoDisplay User's Guide* for details.")
- Names of menus, commands, dialog boxes, fields, and buttons are capitalized as they appear in the product. (Example: "From the File menu, select Print.")
- File names appear either in all capital letters or in mixed case, depending on the file name itself. (Example: "Open the file TEST1.txt.")
- Key names appear in small capital letters. (Example: "Press SHIFT.")
- Key press combinations are indicated by plus signs between two or more key names. For example, SHIFT+F1 is the result of holding down the shift key, then pressing and releasing the F1 key. Similarly, CTRL+ALT+DELETE is the result of pressing and holding the CTRL and ALT keys, then pressing and releasing the DELETE key.
- "Click" means press and release the left mouse button on the referenced item. "Right-click" means press and release the right mouse button on the item.
- Menu commands are referred to with the Menu→Command convention. For example, "File→Open Project" means to select the Open Project command from the File menu.
- Numbered lists indicate procedures to be followed sequentially. Bulleted lists (such as this one) provide general information.

Other FactoryFloor Resources

Documents and Online Help

To help you understand and use the FactoryFloor suite of products, the following resources are provided:

- **Online Help** is available in OptoControl, OptoDisplay, OptoServer, and most of the OptoUtilities. To open online Help, choose Help→Contents and Index in any screen.

- ***OptoControl User's Guide, OptoDisplay User's Guide,*** and ***OptoServer User's Guide*** give step-by-step instructions for using each of these products. The *OptoServer User's Guide* binder also contains a master **FactoryFloor Glossary,** which defines terms for all FactoryFloor products.

  Online versions (Adobe® Acrobat® format) of these and other FactoryFloor documents are available from the Help menu in your FactoryFloor application. To view a document, select Help→Manuals, and then choose a document from the submenu.
- ***OptoControl Command Reference*** contains detailed information about each command (instruction) available in OptoControl.
- Two **quick reference cards**, *OptoControl Commands* and *Beginner's Guide to OptoControl Commands*, are located in the front pocket of the *OptoControl Command Reference*.
- FactoryFloor resources are also available on the Opto 22 Web site at factoryfloor.opto22.com. You can conveniently access this and other sections of the Opto 22 Web site using the Help menu in your FactoryFloor application. Select Help→Opto 22 on the Web, and then select an online resource from the submenu.

Product Support

If you have any questions about FactoryFloor, you can call, fax, or e-mail Opto 22 Product Support.

Phone:	800-TEK-OPTO (835-6786) 951-695-3080 (Hours are Monday through Friday, 7 a.m. to 5 p.m. Pacific Time)
Fax:	951-695-3017
Email:	support@opto22.com
Opto 22 Web site:	support.opto22.com

NOTE: Email messages and phone calls to Opto 22 Product Support are grouped together and answered in the order received; neither takes priority.

When calling for technical support, be prepared to provide the following information about your system to the Product Support engineer:

- Software and version being used
- Controller firmware version
- PC configuration (type of processor, speed, memory, operating system)
- A complete description of your hardware and operating systems, including:
  - jumper configuration
  - accessories installed (such as expansion daughter cards)
  - type of power supply
  - types of I/O units installed
  - third-party devices installed (e.g., barcode readers)
- Specific error messages seen.

Installing OptoServer

OptoServer installation is easy and quick. Insert the FactoryFloor CD in your CD-ROM drive, and the installation wizard should appear. If the wizard does not appear, start Windows Explorer and navigate to your CD-ROM drive. Double-click Setup.exe to begin installation.

If you have trouble installing OptoServer or need 3.5-inch disks rather than a CD, contact Opto 22 Product Support at 800/835-6786 or 951/695-3080.

System Requirements

Installation Requirements

Here's what you need to install and run FactoryFloor_app_name:

- A computer with at least the minimum processor required for your version of Microsoft® Windows® (1 GHz Pentium®-class or better recommended). Additional computer requirements include:
  - Ethernet capability, if using an M4-series controller with M4SENET-100 Ethernet adapter card.
  - An RS-232 serial port and serial cable, for downloading firmware updates to a controller.
- Microsoft Windows XP or Windows 2000® workstation operating system with the most recent service packs.
- At least 128 MB RAM (256 MB recommended)
- At least 125 MB of available hard drive space
- VGA or higher resolution monitor (Super VGA recommended)
- Mouse or other pointing device
- Installed Windows printer (optional).

For OptoDisplay and OptoControl Users

If you're planning to use an OptoDisplay or OptoControl client with OptoServer, the minimum versions are OptoDisplay 3.1 and OptoControl 3.1.

Network Requirements

TCP/IP network protocol is required if OptoServer is used with OptoControl, OptoDisplay, or other applications using the OptoCom.dll (such as Microsoft Visual Basic applications you can write yourself). The networking connection uses RPC over TCP/IP.

IMPORTANT: *If you have an ARCNET card in your PC at the time you install a Windows 95, Windows 98, or Windows NT operating system, make sure a network driver doesn't get installed on the card. Windows 95, Windows 98, and Windows NT operating systems automatically try to*

install a network driver on an ARCNET card. Allowing the driver to be installed can produce unpredictable results from OptoServer. For more information, see the Application Note on our Web site, www.opto22.com.

Additional Software Requirements

Verify that the minimum version of OptoCom.dll is 3.1. This driver is used by any program that needs to communicate to a controller.

Additional Hardware Requirements

OptoServer requires some additional hardware as well as some firmware. Typically, you need:

- Opto 22 controller
- Opto 22 I/O units (Opto 22 brains plus SNAP, G4, or G1 I/O modules)

To communicate with a controller, the following additional hardware is required:

- One of the following communication methods:
  - Standard RS-232 serial port
  - Ethernet card
  - Contemporary Controls PCA66 Series ARCNET card
  - Contemporary controls PCI20 ARCNET cards (PCI20-CXS, PCI20-FOG-ST, or PCI20-485)
  - Opto 22's AC24AT, AC37, AC47, or AC422AT adapter cards
- Serial cables, or ARCNET coaxial cables and hubs, for multidrop connections from the PC to the controllers. Opto 22 recommends the Contemporary Controls Mod Hub series of active hubs. The appropriate expansion cards are:
  - EXP-CXS Coax Star
  - EXP-FOG-ST Fiber ARCNET
  - EXP-485 Twisted-pair ARCNET (DC coupled)

NOTE: If you are using OptoRuntimePC for your controller, you do not need any additional hardware to communicate with it, although you may require an adapter card to communicate with your I/O units. Also, if you are using a G4LC32ISA or G4LC32ISA-LT controller, you can communicate with it through the ISA bus in your PC.

OPC

No additional hardware is necessary for OPC.

DDE and NetDDE

OptoServer is compatible with DDE and NetDDE. NetDDE is required for clients connecting to OptoServer across a network. OptoServer also supports Fast DDE and Advanced DDE.

Installing on Windows NT

Windows NT users must have write access to the registry and the Windows\System32 directory to successfully install and use this product.

If FactoryFloor has never been installed on the computer before, you must reboot your Windows NT system after the first time you make changes to communication settings for any port. If an older version of FactoryFloor was previously installed on the computer, however, one or more controllers will already be defined, and it is not necessary to reboot the system.

Firmware Requirements

Firmware is loaded on your controller so that you can download and run OptoControl strategies. If your controller's firmware is not at the required release number, you'll receive an error message. You can use the OptoTerm utility (explained in the Troubleshooting appendix of the *OptoControl User's Guide*) to download the firmware to the controller.

NOTE: If you have a non-flash controller, you need to contact Opto 22 Product Support for an EEPROM upgrade.

CHAPTER 1

Quick Start

Introduction

In this chapter, we'll explain how to quickly get OptoServer up and running on a PC in two ways: first, communicating with an OptoDisplay client in a networked environment, and second, communicating with a DDE-aware application.

The two Quick Start procedures differ because OptoServer has two executable files for communicating with client applications:

- Communication Data Server (OptoCds.exe) is used for OptoDisplay, OptoControl, and other programs that use the OptoCom.dll for communication.
- OptoServer (Mds.exe) is used for DDE-aware and OPC-compliant applications.

We'll discuss these differences in more detail in Chapter 2.

In This Chapter

Communicating with an OptoDisplay Client 1-1
Communicating with a DDE-Aware Client 1-8

Communicating with an OptoDisplay Client

In this first Quick Start section we will set up OptoServer to provide information to an OptoDisplay client. In a typical setup, OptoServer and OptoDisplay are running on different computers. For this example, however, we'll run OptoServer and OptoDisplay on the same computer so we can easily demonstrate the configuration process. This section guides you through the steps to monitor the Cookie Controller from OptoDisplay as if OptoDisplay were talking to OptoServer on another computer. Briefly, these steps are:

- Use OptoControl to download the strategy to the controller and verify communication. The OptoControl strategy used is the cfactory.cdb example that comes with OptoServer.
- Start the Communication Data Server (OptoServer) so that it is ready to be accessed by OptoDisplay.

- Configure OptoDisplay to communicate to a server-based controller rather than a direct, or local, controller. The OptoDisplay project used is cfactory.mmi.
- Start OptoDisplay Runtime.

Downloading the Strategy to the Controller and Verifying Communication

1. Start OptoControl by clicking the Start button and selecting Programs→Opto 22→FactoryFloor 4.0→OptoControl→OptoControl.
2. From the File menu, choose Open Strategy. Navigate to Opto 22\Shared\Cookies\Control and open the file cfactory.cdb.
3. Configure the strategy for your controller's connection, address, and port settings, and enter "Cookie Controller" as the controller's name.

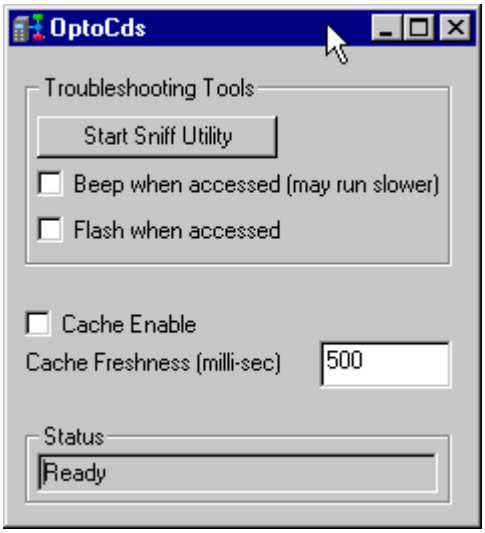
   If you need help, see "Configuring Controllers" in the *OptoControl User's Guide*.
4. Compile the program by selecting Compile→Compile All.
5. Change to Debug mode and run the program.
6. Verify that the controller is communicating with your PC. Observe whether the controller's host port LEDs (ARCNET, COM0, etc.) flash in response to messages from the PC.

   If your controller is responding to your PC with no errors, you're ready to move on to the next step. If you think you're having problems getting your controller to respond to the OptoControl strategy, make sure the configuration setup and cable wiring between the controller and PC are correct. Consult the *OptoControl User's Guide* and your controller manual to help you troubleshoot the problem.
7. When the controller is communicating with the PC, leave the strategy running and exit OptoControl.

Starting Communication Data Server (OptoServer)

1. Click the Start button and select Programs→Opto 22→FactoryFloor 4.0→OptoServer→Communication Data Server.

   The Communication Data Server window appears:



2. Click the minimize button to reduce the Communication Data Server window to an icon.

Configuring OptoDisplay

Next, we'll configure the OptoDisplay sample program so it uses OptoServer for its data updates. To do so, we must change OptoDisplay's PC communication port (for example, COM1, COM2, ARCNET) from its direct controller hardware connection to the networked PC that is running OptoServer.

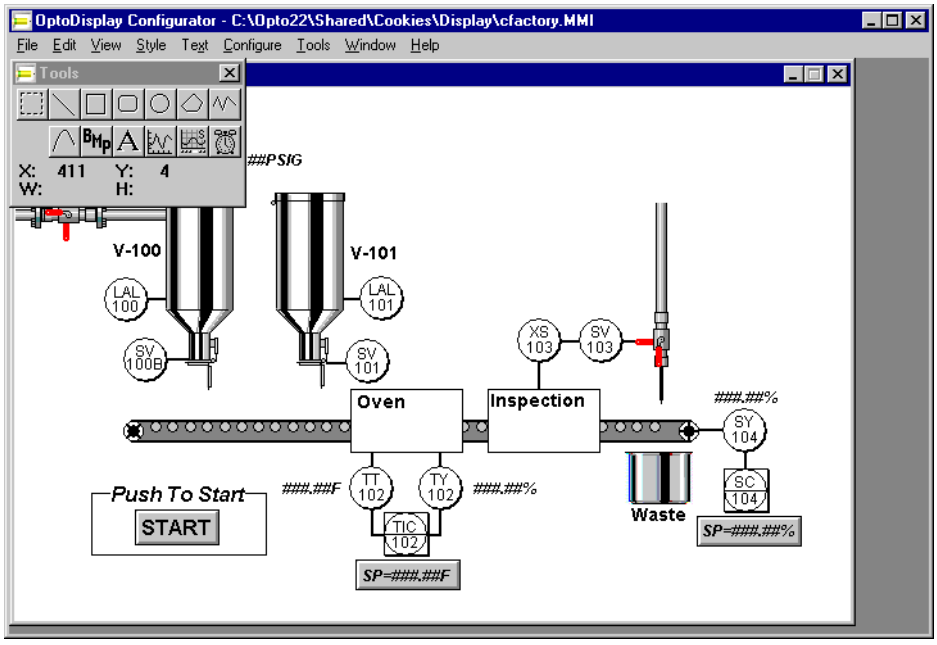
1. Start OptoDisplay Configurator by clicking the Start button and selecting Programs→Opto 22→FactoryFloor 4.0→OptoDisplay→OptoDisplay Configurator.

   The OptoDisplay Configurator main window appears.

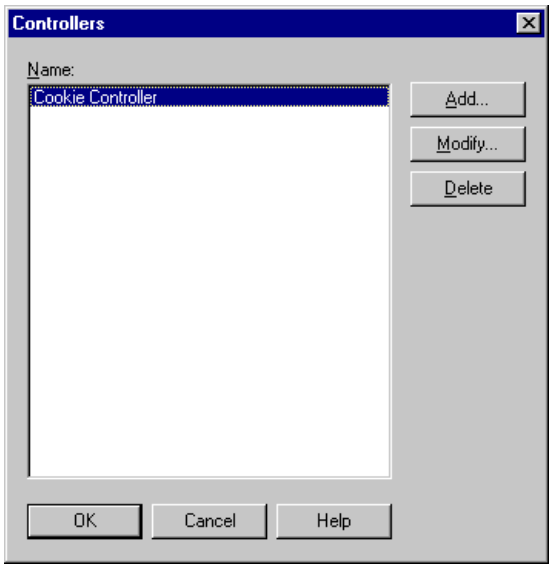
2. Select File→Open Project.

3. In the Open Project dialog box, navigate to Opto 22\Shared\Cookies\Display and open cfactory.mmi.

The OptoDisplay project is loaded and its graphics appear in the main draw window:



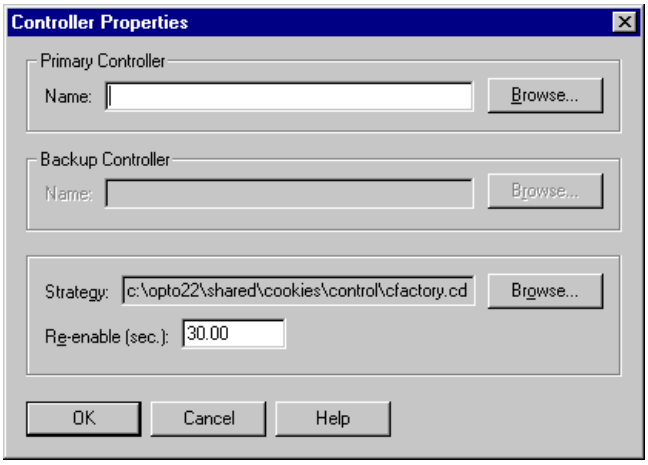
4. Choose Configure→Controller(s).



5. Choose one of the following:
   - If Cookie Controller appears in the list, click Modify so you can change its configuration. Skip to step 7.
   - If Cookie Controller does not appear in the list, click Add.

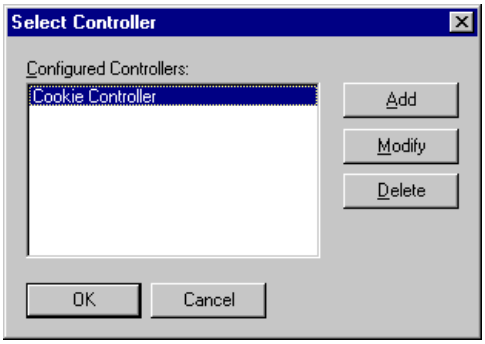
6. In the Strategy File Name Selection dialog box, select Shared\Cookies\Control\cfactory.cdb.

   The Controller Properties dialog box appears. The controller name may or may not be shown:



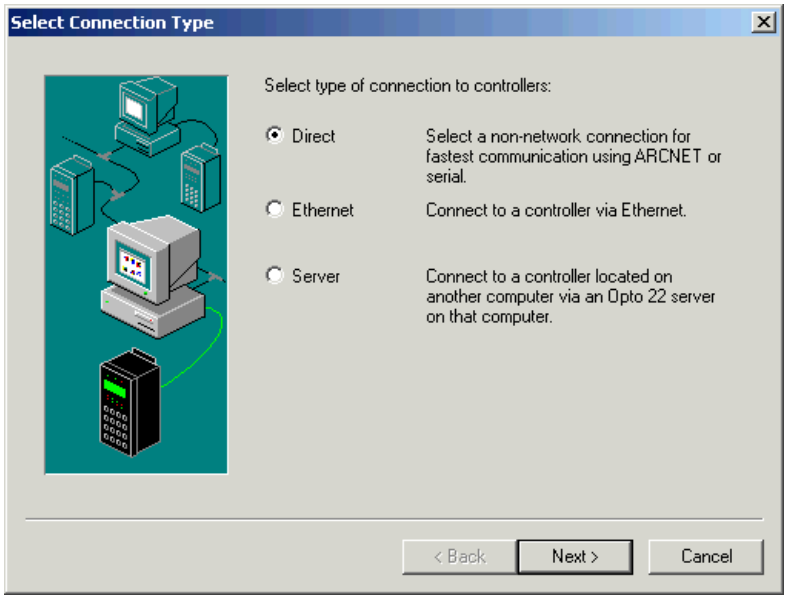
7. In the Controller Properties dialog box, click the Browse button next to Primary Controller.

   The Select Controller dialog box appears:



8. Select Cookie Controller from the list and click Modify.

The Select Connection Type dialog box appears, with Direct shown as the type of connection. We're going to change the connection.


Select Connection Type
Select type of connection to controllers:
Direct
Select a non-network connection for fastest communication using ARCNET or serial.
Ethernet
Connect to a controller via Ethernet.
Server
Connect to a controller located on another computer via an Opto 22 server on that computer.
< Back
Next >
Cancel

9. Click Server and then click Next.

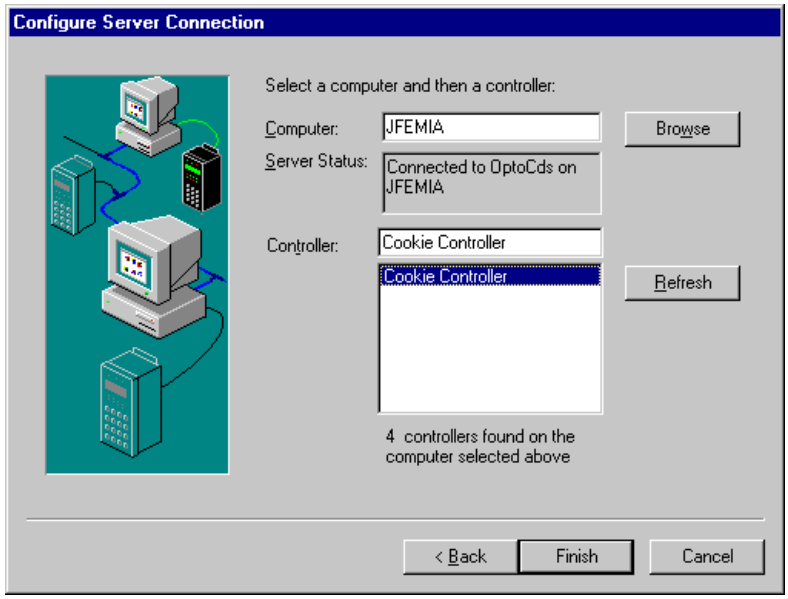
   This option connects the OptoDisplay project to a controller located on another computer on the same network.

10. In the Configure Server Connection dialog box, click the Browse button and locate the computer where the OptoServer program (Communication Data Server) is running.

    For this example it's the same computer; but usually it is a different computer on the network. Communication Data Server must be running on the computer you choose. When you choose a computer, a list of controllers attached to the computer appears in the list.

11. Highlight the controller you want to use to update the OptoDisplay strategy (in this case, Cookie Controller).

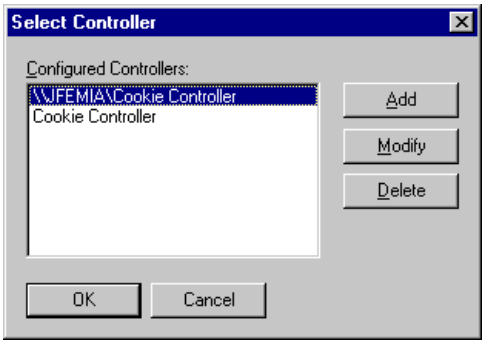
Its name appears in the Controller field, and the dialog box looks something like this:



You may need to click Refresh to see the controller names.

12. Click Finish.

Notice that a new controller name appears in the Configured Controllers list. It is the name of the server computer with the controller's name appended:

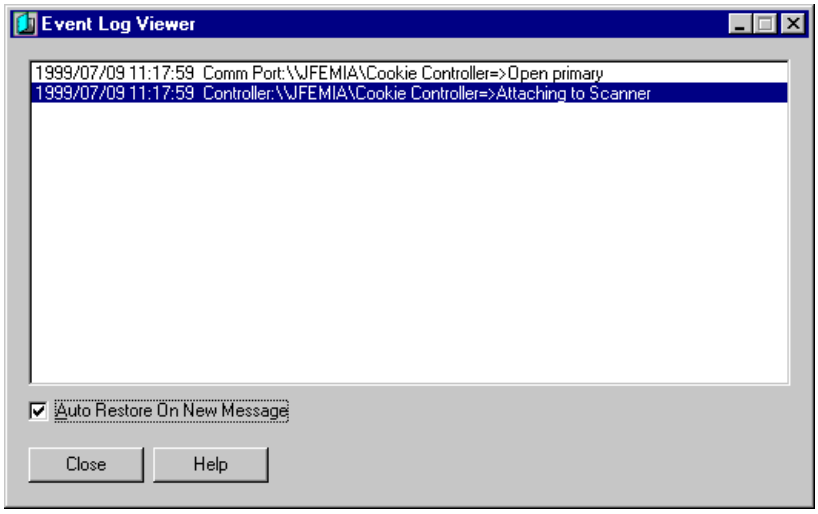


13. Make sure the new controller name is highlighted, and click OK to close the Select Controller dialog box. Click OK again to close the Controller Properties dialog box and the Controllers dialog box.

14. Choose File→Save Project and Load Runtime.

Running OptoDisplay

OptoDisplay opens and the Event Log Viewer window appears:



In this window you can see that OptoDisplay has connected to the controller through OptoServer. Congratulations! The connection is complete.

Communicating with a DDE-Aware Client

In this second Quick Start section, we will set up OptoServer to provide information to a DDE-aware client, in this case Microsoft Access. In a typical setup, OptoServer and Access would be running on different computers attached to the same network. For this example, however, we'll run them on the same computer to show the configuration process. Briefly, we'll follow these steps:

- Use OptoControl to download a strategy to the controller and verify communication.
- Use the OptoServer Administrator to configure a controller attached to the computer running OptoServer.
- Start OptoServer so that it is ready to be accessed by Access.
- Start Access.

Downloading a Strategy to the Controller and Verifying Communication

1. Start OptoControl by clicking Start and selecting Programs→Opto 22→FactoryFloor 4.0→OptoControl→OptoControl.

2. From the File menu, choose Open Strategy. Navigate to Opto 22\FactoryFloor\OptoSrvr\Examples\OptoCtrl and open the sample strategy dde_test.cdb.

3. Configure the strategy for your controller's connection, address, and port settings, and enter "mistic1" as the controller's name.

   If you need help, see "Configuring Controllers" in the *OptoControl User's Guide*.

4. Compile the program by selecting Compile→Compile All.

5. Change to Debug mode and run the program.

6. Verify that the controller is communicating with your PC. Observe whether the controller's host port LEDs (ARCNET, COM0, etc.) flash in response to messages from the PC.

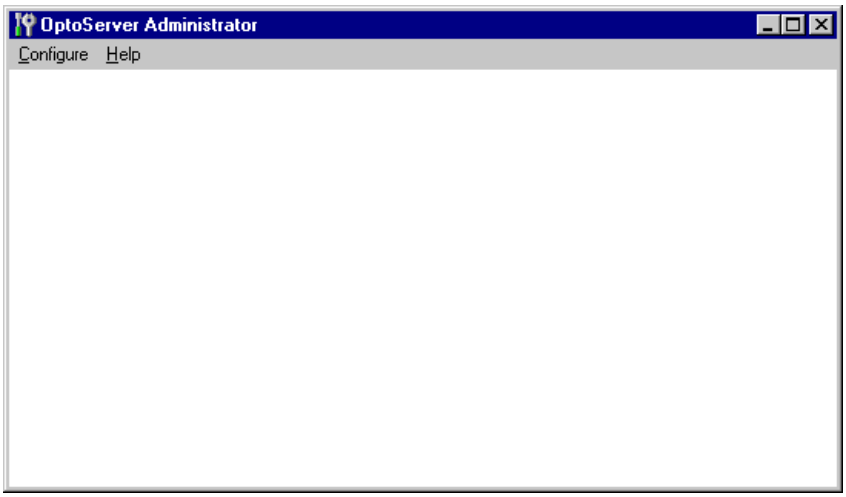
   If your controller is responding to your PC with no errors, you're ready to move on to the next step. If you experience problems getting your controller to respond to the OptoControl strategy, make sure the configuration setup and cable wiring between the controller and PC are correct. Consult the *OptoControl User's Guide* and your controller manual to help you troubleshoot the problem.

7. When the controller is communicating with the PC, leave the strategy running and exit OptoControl.

Using OptoServer Administrator to Configure a Controller

1. Start OptoServer Administrator by clicking the Start button and selecting Programs→Opto 22→FactoryFloor 4.0→OptoServer→OptoServer Administrator.

   The OptoServer Administrator main window appears. It is empty:

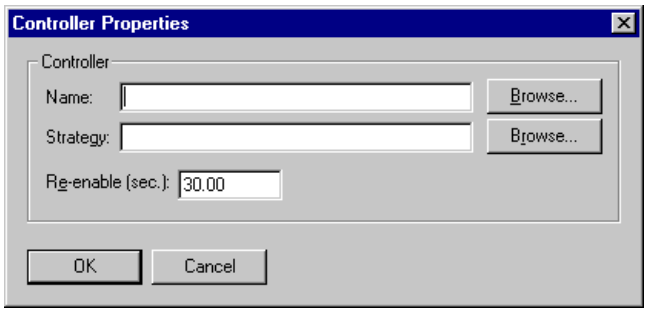


2. Select Configure→Controllers.

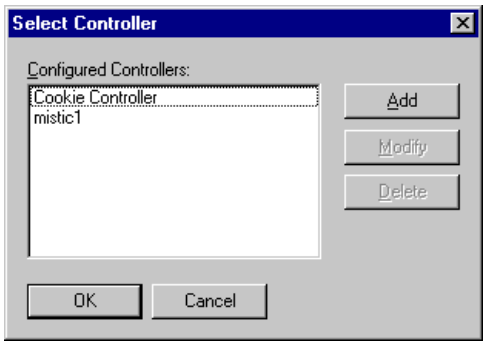
When you configure a controller for the first time in the OptoServer Administrator, a message says that a file can't be found. Click OK to continue. The necessary file is created.

3. In the Controllers dialog box, click the Add button so you can add a controller.

   The Controller Properties dialog box appears.

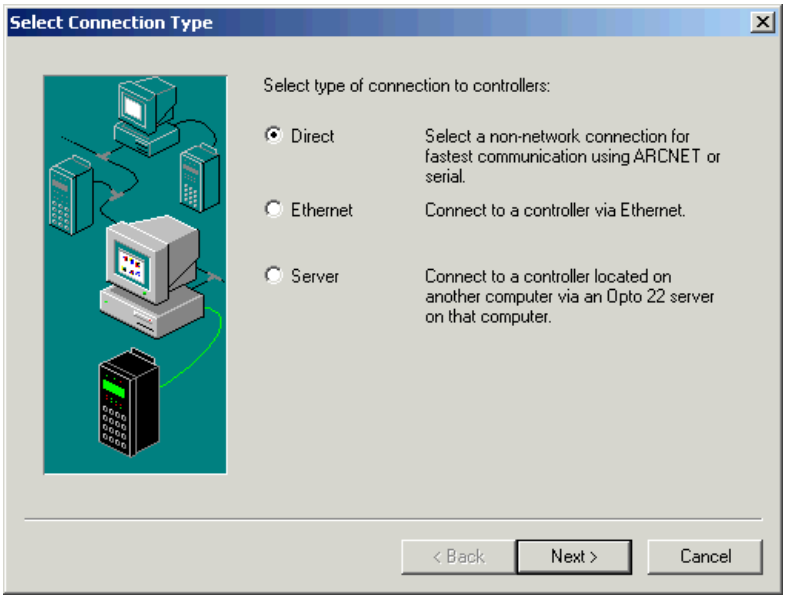


4. Click the Browse button next to Name.



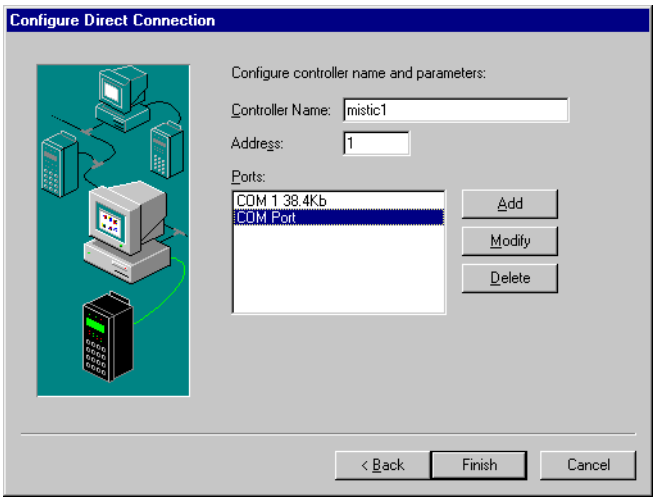
5. In the Select Controller dialog box, click the mistic1 controller you set up in the OptoControl strategy. Click Modify to check the controller's configuration.

The type of connection should be shown as Direct:


Select Connection Type
Select type of connection to controllers:
Direct
Select a non-network connection for fastest communication using ARCNET or serial.
Ethernet
Connect to a controller via Ethernet.
Server
Connect to a controller located on another computer via an Opto 22 server on that computer.
< Back
Next >
Cancel

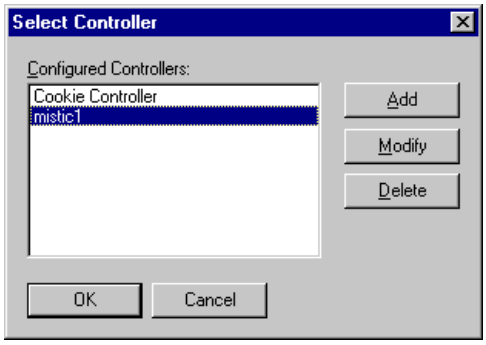
6. Click Next.

   The Configure Direct Connection dialog box appears, with the mistic1 controller listed in the Controller Name field:

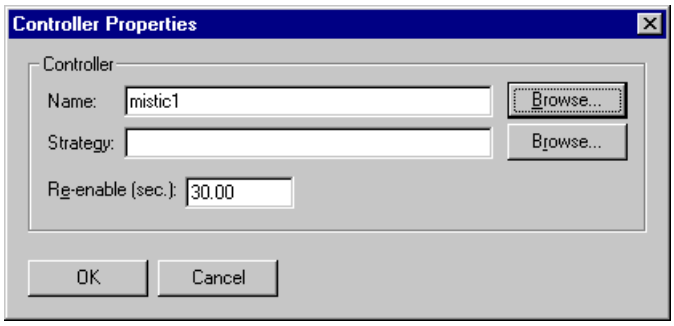


7. If necessary, change the controller's address in the Address field. Highlight the port for direct connection to your controller. If you need to add a port, click Add. (For help, see "Configuring Controllers" in the *OptoControl User's Guide*.) When the address and port are correct, click Finish.

The newly configured controller appears in the Select Controller dialog box:



8. Click the new controller to highlight it, and click OK.



NOTE: If you need to change the Re-enable setting, you can do so here. For more information, see "Understanding Timeout, Retries, and Re-enable Settings" on page A-3.

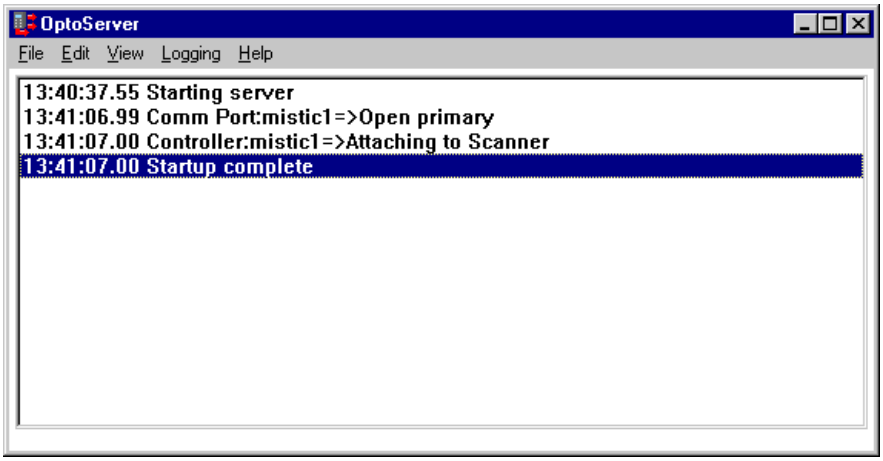
9. Click OK to close the Controller Properties dialog box. Click OK again to close the Controllers dialog box.

10. Exit OptoServer Administrator.

Starting OptoServer

1. Click the Start button and select Programs→Opto 22→FactoryFloor 4.0→OptoServer→OptoServer.

The OptoServer main window appears:



The previous figure shows OptoServer recognizing only the mistic1 controller. Your screen may differ; it shows any controllers you have configured in OptoServer Administrator.

2. Click the Logging menu and make sure the following logging options are checked:
   - Log to Window—The main window displays messages.
   - Log level Normal—Only significant OptoServer communication events are recorded.
   - Log with Time—Messages are saved with a time stamp.

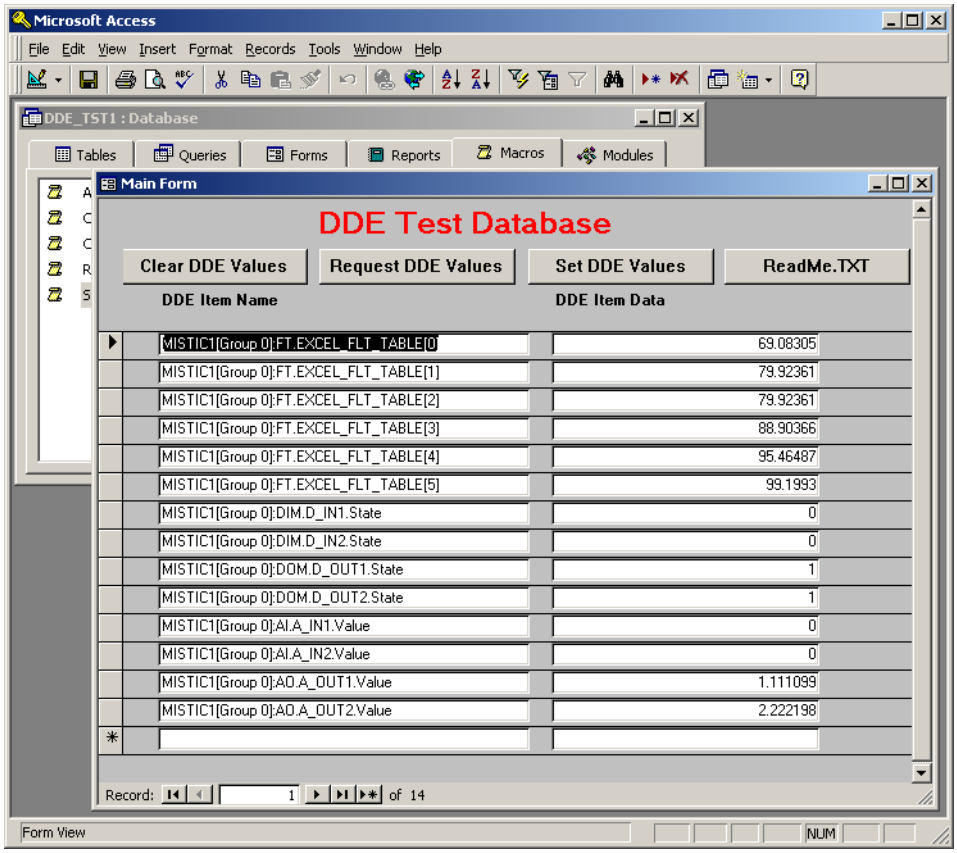
3. Click the minimize button to reduce the OptoServer window to an icon. **Do not exit OptoServer.**

Starting Microsoft Access

1. Start Microsoft Access and open the file OptoSrvr\Examples\Access97\Dde_tst1.mdb.

   Depending on the version of Access you are using, you may see warning messages as the file opens. This sample database has been tested with Access 97 only; if you use Microsoft Access 2000 or a later version, you may need to convert or modify the database file and the corresponding Visual Basic for Applications (VBA) macros it uses.

When the file opens, it looks something like this:



2. Click Request DDE Values and watch as the values in the database fields are updated. Wait a few moments and click again to see how the values reported from the controller change over time.

Congratulations! The DDE setup is complete. For more information about DDE-aware clients, see Chapter 3, "OptoServer and DDE-Aware Clients."

CHAPTER 2

What Is OptoServer?

Introduction

In the previous chapter, we got right to work with OptoServer without discussing much of what it is. In this chapter, we'll define OptoServer and see how you'll benefit by using it with your networked Opto 22 control system.

In This Chapter

About OptoServer 2-1
Client/Server Basics 2-3
Using OptoServer Efficiently 2-4
Working in OptoServer Administrator 2-7
Working with OptoServer (Mds.exe) 2-10
Working with Communication Data Server 2-13

About OptoServer

OptoServer is an application that allows its clients to easily access data from networked Opto 22 controllers. Examples of clients are:

- OptoDisplay, OptoControl, and other Opto 22 FactoryFloor applications
- Any OPC 1.0-compliant application, such as a human-machine interface (HMI)
- Any DDE-aware application, such as Microsoft Word
- Any application you have developed that uses the OptoControl SDK.

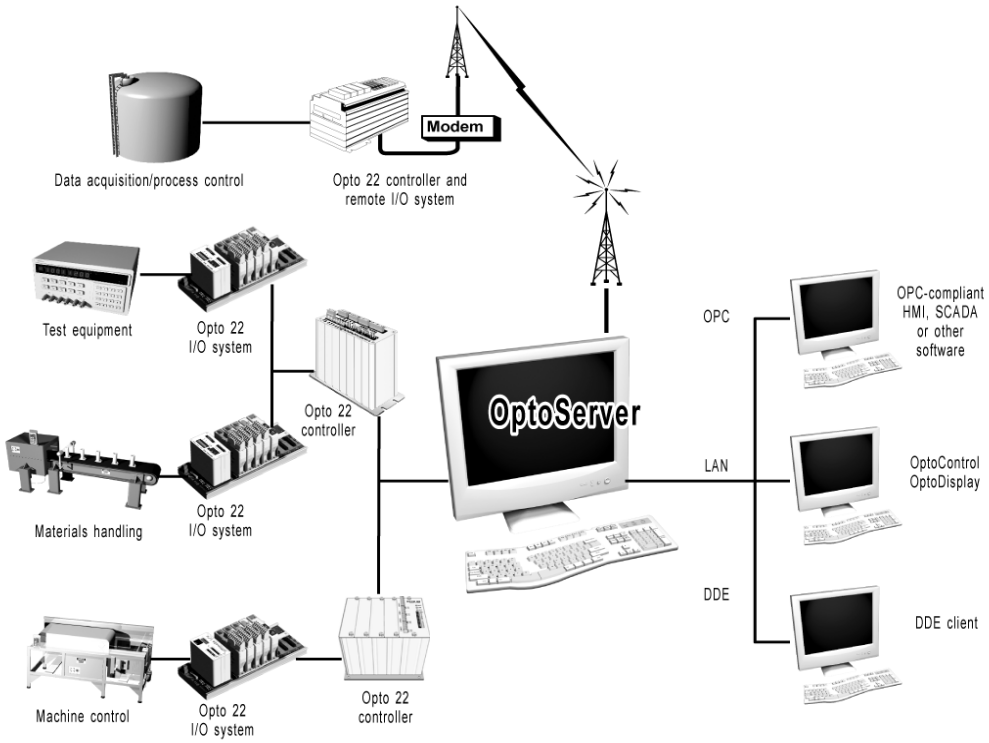
Here are examples of OptoServer in use:

- A computer running OptoDisplay updates data from a controller connected to another computer on the same Microsoft network.
- A computer running OptoControl downloads and debugs a strategy on a controller connected to another computer on the same network.
- An OPC-compliant or DDE-aware application uses data from an Opto 22 controller that is either on the same computer or on another computer accessible via NetDDE.

Why Use OptoServer?

OptoServer's advantage is that it provides real-time information to multiple PCs needing data from the same Opto 22 controller(s), without slowing down the controller's throughput.

The following figure shows a sample OptoServer setup.



As you can see, several computer terminals, each running Opto 22, OPC-compliant, or DDE-aware clients, are networked to a PC running OptoServer. The PC running OptoServer has a direct physical connection to Opto 22 controllers via ARCNET, RS-485, Ethernet, or any other Opto 22 controller-supported communication option.

For OPC and DDE clients, OptoServer scans controllers at the rate you set and sends data to clients. For Opto 22 clients such as OptoDisplay, OptoServer provides a connection to remote controllers and a cache option to reduce the amount of scanning necessary. Without OptoServer, each client would scan the Opto 22 controllers independently for data updates—and probably slow down the controllers' throughput rates.

The OptoServer Package

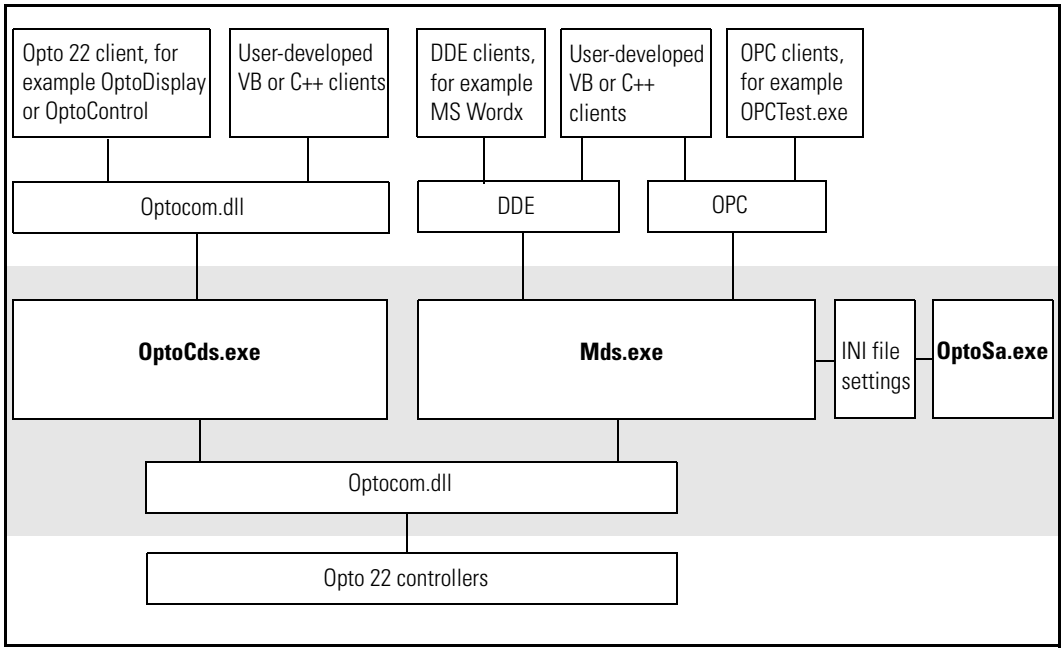
Three programs make up the OptoServer package:

- OptoServer Administrator (OptoSa.exe)—Used to select the controllers that OPC, DDE, and OptoDisplay clients need to access. Also used to set scan times for OPC and DDE

clients or to configure the behavior of DDE transactions. (Scan times for OptoDisplay are configured in the OptoDisplay Configurator.)

- OptoServer (Mds.exe)—A server that scans for data requested by OPC or DDE clients and sends data from client(s) to controller(s).
- Communication Data Server (OptoCds.exe)—A server that communicates with other Opto 22 applications such as OptoControl and OptoDisplay (or any other application that uses OptoCom.dll). OptoCds starts automatically when OptoServer starts or can be launched independently.

The following figure illustrates how these programs communicate with each other and their clients. All the applications in the shaded area are on one computer; the applications above the shaded area can be on the same computer or on multiple computers that are networked.



Client/Server Basics

OptoDisplay projects, OptoControl strategies, and OPC-compliant or DDE-aware applications running under Microsoft Windows 95, Windows 98, or Windows NT can exchange data on a real-time basis by engaging in a conversation—a series of exchanged messages between applications to request and supply data. The application initiating the conversation and requesting or sending ("poking") data is the client. The application supplying the data is the server.

OptoServer is an example of a server, while OptoDisplay, an OPC-compliant HMI, and Microsoft Word are examples of clients. Clients and servers are typically connected together over a local area network such as Ethernet or ARCNET. Clients must be registered with the server to receive or send information.

OPC and DDE Clients

OptoServer (Mds.exe) scans the controllers on the network and provides data to OPC and DDE clients. Scan rates for OPC-compliant and DDE-aware clients are set up in the OptoServer Administrator program. See "Optimizing OptoServer Scanning" on page 2-5 for more information.

OPC-compliant and DDE-aware clients are sent information on a report-by-exception basis. This means they are only sent data that is newer than or different from the last information OptoServer sent.

Opto 22 Clients

The Communication Data Server (OptoCds.exe) provides a conduit for OptoDisplay and other Opto 22 clients to scan controllers on the network. Because these clients do their own scanning, scan rates are set in the client. For example, you can set scan rates for OptoDisplay in the OptoDisplay Configurator.

Since the bottleneck in communications is at the controller, OptoCds uses a cache to reduce unnecessary or repetitive scanning. OptoCds stores the scanned data from controllers in the cache. If a client such as OptoDisplay requests data that is in the cache, the server delivers it immediately. This cache is similar to a disk cache or Internet cache. It improves throughput because it's much faster to retrieve data from the cache in memory than from the controller. Here's an example of how the cache works:

1. OptoDisplay Client A requests data for a window.
2. The request goes through the Communication Data Server to the controller.
3. The controller responds through OptoCds to OptoDisplay Client A. OptoCds stores the response, as well as the corresponding command and the identity of the controller, in the cache.
4. OptoDisplay Client B requests the same data for the same window.
5. The request goes through OptoCds, which checks the cache. If the data is still fresh, OptoCds delivers the previous response stored in the cache to OptoDisplay Client B. If the data is stale, OptoCds contacts the controller, delivers the new data to the client, and stores the new data in the cache.

You can turn caching on or off in the Communication Data Server and also set the freshness time for the data. See "Working with Communication Data Server" on page 2-13 for more information.

Using OptoServer Efficiently

If the computer running OptoDisplay has a connection to the controller, you should run OptoDisplay using that connection rather than using OptoServer. Using OptoServer between a

controller and OptoDisplay is slower and less efficient than a connection without OptoServer. One of the main purposes of OptoServer is to provide a connection between computer and controller when no other connection exists.

You may run into a bottleneck if OptoServer is run on only one computer and is used for a large number of clients. A bottleneck can occur for two reasons: first, the volume of data may be too much for one OptoServer application and computer to handle, and second, OptoServer scans multiple controllers sequentially. In contrast, if several computers are running OptoDisplay projects, they scan the controllers essentially in parallel; that is, each project scans the controllers independently of the other projects. If a bottleneck occurs, run OptoServer on more than one computer and divide the clients evenly among them.

Optimizing OptoServer Scanning

For OPC and DDE clients, OptoServer scans controllers for data at rates you can set. Up to seven scan rates can be configured, so you can have OptoServer scan data at different rates depending upon the importance or nature of the data. For example, digital points can be scanned every second, while a group of temperature inputs can be scanned every five seconds, since temperatures usually change slowly.

If a PC cannot keep up with the scanning requirements, you'll receive "scanner overrun" notifications. These notifications are not error messages; they occur when the time it takes for the controller to scan the data is longer than the configured scan time. OptoServer gets a "server data" notification if the server scans for new data before it can send already-scanned data to the client.

NOTE: For OptoDisplay clients, scanner overrun notifications appear in OptoDisplay. You can enable or disable notification in the Refresh Times dialog box in the OptoDisplay Configurator.

Scanning and OptoDisplay

When OptoDisplay scans for data, it combines data items into groups. Due to communications overhead, sending data in one large group is faster than sending several smaller data requests.

Keep in mind the following data group characteristics and how they affect scanning:

- Each OptoDisplay draw window has its own group of data items.
- Data items with different scan times from the same OptoDisplay draw window are combined into separate groups.
- The maximum number of data items in a group is 50.
- Strings are not combined into groups.
- Data written to a controller is not grouped.

Adjusting Scan Times

Here's a suggested method you can use to find an optimum scan time for your OptoServer system and help avoid scanner overrun errors. The goal is to scan the controller(s) as often as possible

to provide the latest data to clients, without affecting the controller's throughput and giving constant scanner overruns.

Follow these steps to adjust scan times:

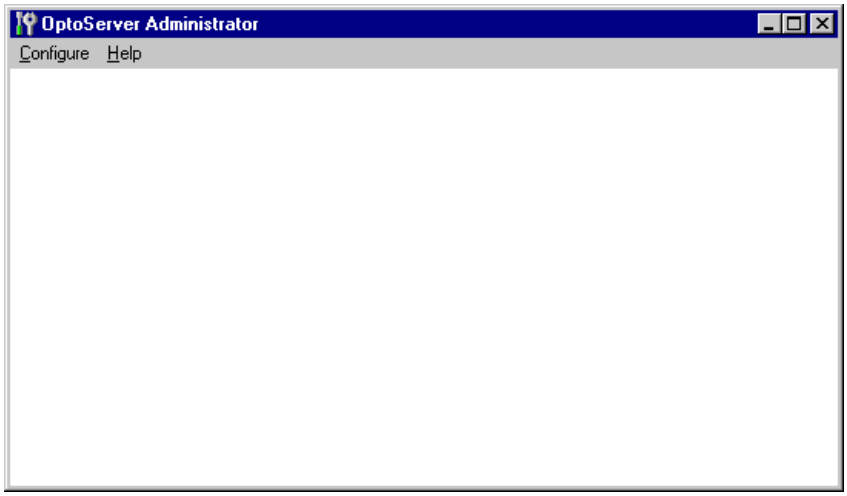
1. Set all client scan times to a long interval to ensure a "quiet time" (no communication activity) between scans. Start out with a 30-second interval.
   - For OptoDisplay clients, set scan times in the OptoDisplay Configurator. (See the *OptoDisplay User's Guide* for instructions.)
   - For DDE-aware clients, set scan times in the OptoServer Administrator as explained in "Setting Refresh Times" on page 2-8.
2. Run your OptoControl, OptoServer, and OptoDisplay applications.
3. Use a stop watch to time the duration of communication activity during a scan interval. Use the communication LEDs on the Opto 22 controller to monitor the activity.
4. Adjust your scan times to a value greater than the communication activity duration you measured.
5. Use prime numbers for scan values. That way scan values won't be multiples of each other and occur at the same time.
6. To further adjust your scan times:
   a. Shorten the digital I/O scan times and lengthen the analog I/O scan times.
   b. Set the refresh group name's freshness value equal to its scan time. By doing so, the controller won't have to scan I/O units as frequently.

Working in OptoServer Administrator

You use OptoServer Administrator to configure controllers and to set refresh times for OPC-compliant and DDE-aware clients.

To open OptoServer Administrator, click the Start button and choose Programs→Opto 22→FactoryFloor 4.0→OptoServer→OptoServer Administrator.

The OptoServer Administrator main window appears:

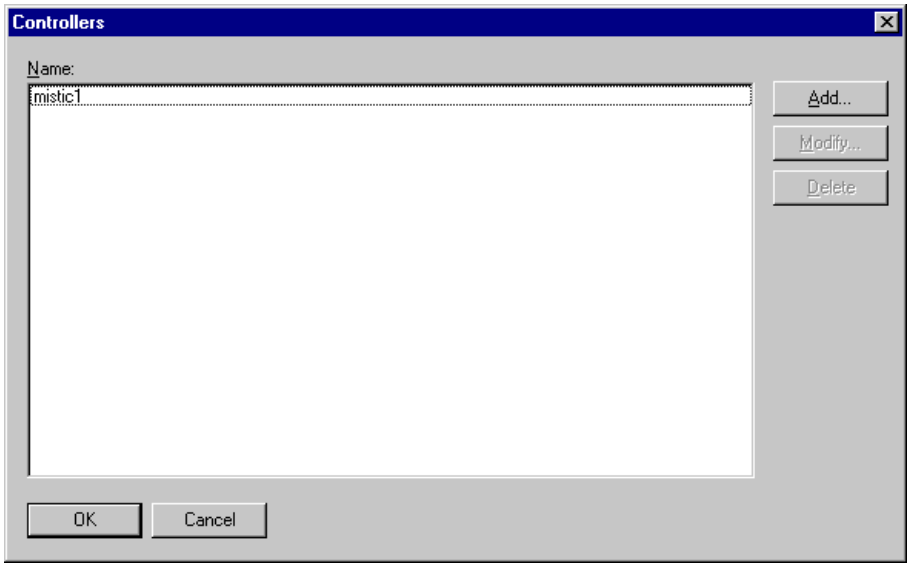


Online Help is available in OptoServer Administrator from the Help menu.

Configuring Controllers

1. In the OptoServer main window, select Configure→Controllers.
2. If a message says that the OptoMds.ini file cannot be found, click OK to continue. The necessary file is created.

The Controllers dialog box lists all currently configured controllers:



Adding, changing, and deleting controllers is the same as in OptoControl. For detailed steps, see "Working With Controllers" in the *OptoControl User's Guide*.

Setting Refresh Times

You use OptoServer Administrator to set scan rates and freshness values for OPC-compliant and DDE-aware clients, such as Microsoft Word. Refresh names are used in client messages. (See Chapters 3 and 4 for more information on client messages.) Here is a sample DDE message using the default refresh name "Group 0":

```
MDS|OPTO_MDS_0!'MyMistic[Group 0]:I.TEST_INT'
```

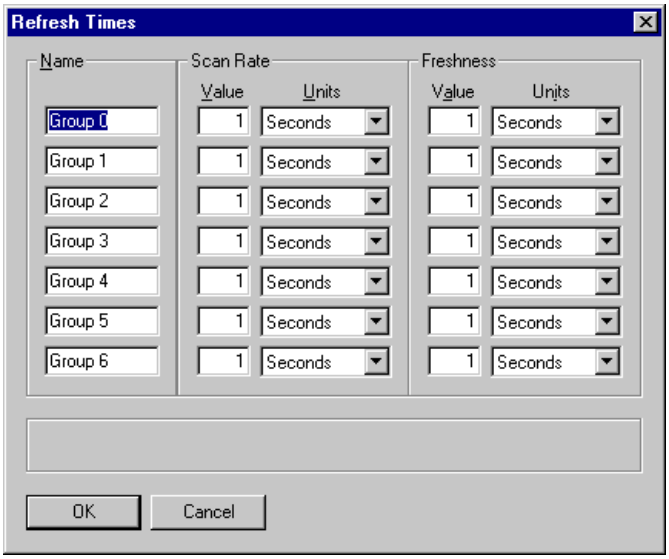
You can set up to seven refresh names, each with its own refresh time, and a client can use more than one refresh name. Using more than one name is helpful if you have groups of I/O with different scan rates, for example, analog I/O points to read the outdoor temperature and digital I/O sensing whether a security gate is open. Since outdoor temperatures are fairly stable, the scan rate for the analog I/O would typically be longer than the scan rate for the digital I/O group.

NOTE: See "Optimizing OptoServer Scanning" on page 2-5 for additional information about scanning rates and refresh times, especially if you are using OptoServer with OptoDisplay as well as DDE-aware clients.

Follow these steps to set scan rates and refresh times.

1. In the OptoServer Administrator main window, choose Configure→Refresh Times.

The Refresh Times dialog box appears.



2. In the Name column, type a name for the first refresh time you want to set up, or use the default name.

   The name can be up to 15 characters long. Do not use the ! and | characters in the name. Spaces are valid characters, but remember to include them when creating your client's DDE or OPC message. Don't omit them or substitute an underscore (_) for a space.

3. In the Scan Rate columns, specify how often OptoServer scans the controllers for data by entering a value from zero to 9,999 in the Value field. Select a unit of time from the Units drop-down list (milliseconds, seconds, minutes, hours, days, or months).

   The scan rate must be greater than or equal to the value in the Freshness field. A higher scan rate means more time between I/O readings and fewer times the controller is scanned.

4. In the Freshness field, specify how current (fresh) the data from the controller must be by entering a value from zero to 9,999 in the Value field. Select a unit of time from the Units drop-down list.

   The freshness value must be less than or equal to the value in the Scan Rate field. If the data available from the controller is older than the time specified in the Freshness field, the controller scans the I/O units for new data.

5. Repeat from step 2 for each refresh time you want to set up.

6. When you have finished setting refresh times, click OK.

   You return to the OptoServer Administrator main window.

Changing the Poke Order

If you are using DDE-aware clients and "poking" (writing) multiple values to integer or float tables in OptoControl, you can change the order in which the data is poked.

By default, data is poked in reverse order. For example, in a five-element in a Microsoft Word document, element 1 in the table maps to element 5 in the OptoControl table, element 2 maps to element 4, and so on. To have elements match 1 to 1, 2 to 2, and so on, follow these steps:

1. In OptoServer Administrator, open the Configure menu.
2. Click Reverse Table Poke Order to uncheck it.

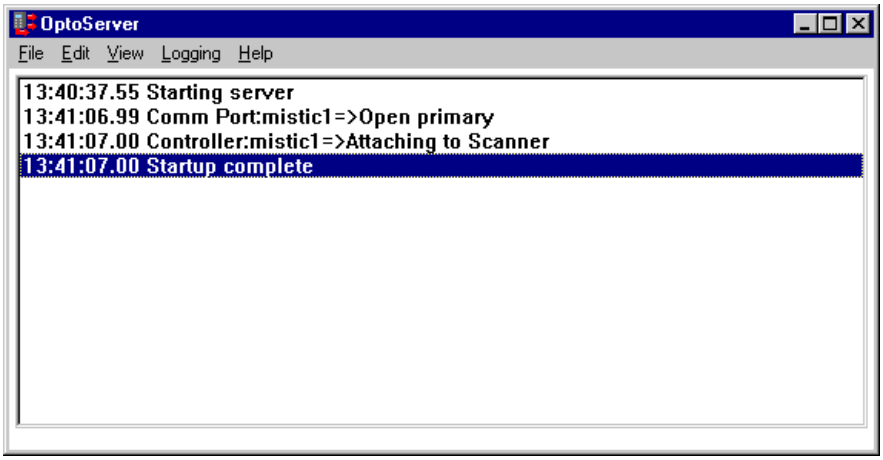
   Pokes will no longer be in reverse order.

Working with OptoServer (Mds.exe)

OptoServer (Mds.exe) is used to communicate with OPC or DDE clients. Besides scanning data for these clients, OptoServer also provides a way to see the number of attached clients and log messages to the screen or a file. Before starting OptoServer, you should have already configured a controller in OptoServer Administrator. (See "Configuring Controllers" on page 2-7.)

To open OptoServer (Mds.exe), click the Start button and select Programs→Opto 22→FactoryFloor 4.0→OptoServer→OptoServer.

The OptoServer main window appears. The following figure shows OptoServer recognizing a mistic1 controller. Your screen shows any controllers you have configured in OptoServer Administrator.



If the OptoServer main window is blank, do the following:

- Configure a controller in OptoServer Administrator. (See page 2-7.)
- Click the Logging menu and make sure Log to Window is checked.

Online Help is available in OptoServer from the Help menu. Note that Communication Data Server (OptoCds.exe) opens when OptoServer opens. For information on using Communication Data Server, see page 2-13.

Viewing the Number of Clients

To view the number of DDE and OPC clients that are connected to OptoServer, choose View→Clients.

A small window appears, showing the number of clients connected to OptoServer. The number includes DDE and OPC clients only. Clients served through the Communication Data Server—for example, OptoDisplay—are not included.

Logging Messages

Status and error messages are normally logged to the OptoServer main window so you can monitor communication with DDE and OPC clients. You can also log messages to a log file. For a list of messages, see page A-5.

Logging to the OptoServer Window

1. To start or stop logging messages to the main window, choose Logging→Log to Window.

   A check mark next to the menu item starts logging; removing the check mark stops logging.

2. To time or date stamp messages, choose one of the following:
   - Logging→Log with Date to include the date of each message in the format DD-MM-YYYY (D=day, M=month, Y=year).
   - Logging→Log with Time to include the time of each message in the format HH:MM:SS:TT. (H=hours, M=minutes, S=seconds, T=hundredths of a second. Time is based on a 24-hour clock.)

3. To select a different level of messages to send to the main window, choose one of the following:
   - Logging→Log Level Normal to show errors and client connections or terminations.
   - Logging→Log Level Diagnostics to show normal logging messages plus all data sent from OptoServer to clients.
   - Logging→Log Level Advanced to show normal and diagnostics data plus all internal OptoServer events. Internal OptoServer events can be used by Opto 22 Product Support staff to help troubleshoot problems if needed.

4. To save your message settings, choose one of the following:
   - File→Save Settings Now to save message log settings immediately.
   - File→Save Settings on Exit to save message log settings when you exit OptoServer.

5. To delete all messages currently in the main window, choose Logging→Clear Log Window.

   If you are logging to a file (see the next section), the log file is not cleared.

6. To see all of a long message that is truncated in the main window, double-click the message or highlight it and choose Logging→View Log Entry.

7. To copy a message to the Windows clipboard, so you can paste it into another Windows application, highlight the message in the OptoServer main window and choose Edit→Copy.

Logging to a File

You can log messages both to the window and to a file so they can be edited, printed, and saved. The file's default file name is mdslog.log, and it is created in the OptoServer root directory (typically Opto 22\FactoryFloor\OptoSrvr).

1. (Optional) If you want to change the name or location of the log file from the default, choose Logging→Select Log File. Navigate to the location where you want the file to be, type in the file name, and click OK.

2. In the OptoServer main window, choose Logging→Log to File so that the menu item is checked.

   The messages begin appearing in the log file.

3. To select a different level of messages to send to the log file, choose one of the following:
   - Logging→Log Level Normal to show errors and client connections or terminations.
   - Logging→Log Level Diagnostics to show normal logging messages plus all data sent from OptoServer to clients.
   - Logging→Log Level Advanced to show normal and diagnostics data plus all internal OptoServer events. Internal OptoServer events can be used by Opto 22 Product Support staff to help troubleshoot problems, if needed.

4. To save your message settings, choose one of the following:
   - File→Save Settings Now to save message log settings immediately.
   - File→Save Settings on Exit to save message log settings when you exit OptoServer.

5. To edit the log file, choose Logging→Edit Log File.

   The Microsoft Windows Notepad editor starts and opens the message log file for editing.

Exiting OptoServer

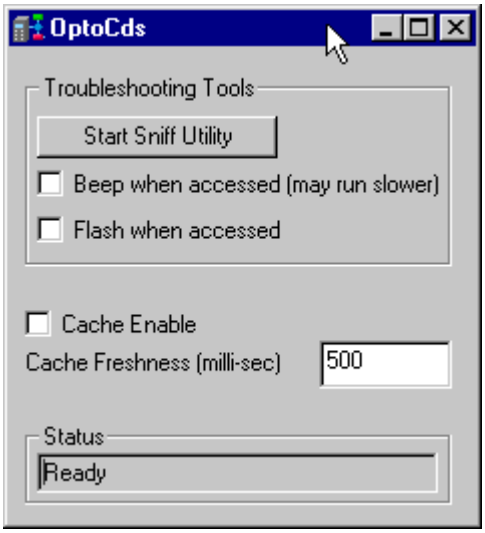
When you exit OptoServer, OPC clients generally stop registering values when the server is disconnected and may indicate a failure to read. DDE clients, however, do not automatically detect the server's absence.

Working with Communication Data Server

Communication Data Server (OptoCds.exe) communicates with other Opto 22 applications such as OptoControl and OptoDisplay. Communication Data Server opens when you launch OptoServer, or you can launch OptoCds separately.

1. To launch OptoCds separately, click the Start button and select Programs→Opto 22→FactoryFloor 4.0→OptoServer→Communication Data Server.

   The Communication Data Server window appears:



2. To turn on the Communication Data Server's caching feature, click Cache Enable to place a check mark in the box.

   See "Opto 22 Clients" on page 2-4 for more information about the cache.

3. If Cache Enable is checked, in the Cache Freshness field enter the length of time in milliseconds that data in the server's cache should be considered fresh.

   If data has been cached longer than this, OptoServer does not deliver the data, and the client has to scan the controller.

Using Troubleshooting Features in Communication Data Server

Three troubleshooting tools are available from the OptoCds window.

To launch OptoSniff, a handy utility for monitoring communication between a PC and a controller, click the Sniff Utility button. For more information on OptoSniff, see the Troubleshooting appendix in the *OptoControl User's Guide*.

To sound a beep whenever a client requests data, check Beep when accessed. Normally this box should be unchecked, because beeps slow performance dramatically. When you're troubleshooting, however, the beeps verify that OptoCds is being accessed.

To have the OptoCds window's title bar flash whenever a client requests data, check Flash when accessed. If the window is minimized, it will flash in the taskbar at the bottom of the computer screen.

CHAPTER 3

OptoServer and DDE-Aware Clients

Introduction

Part of the beauty of OptoServer is its ability to provide information from Opto 22 controllers to third-party applications that can communicate using Dynamic Data Exchange (DDE). This chapter discusses general concepts that apply to all DDE-aware applications and includes a brief procedure for getting Microsoft Visual Basic programs working with OptoServer. Sample programs used to demonstrate this procedures are included with OptoServer.

In This Chapter

General Concepts 3-1
DDE and Case Sensitivity 3-7
Visual Basic and OptoServer 3-8

General Concepts

DDE-aware applications are updated in real time by using OptoServer to scan Opto 22 controllers for information. For example, if you open an OptoServer-registered Microsoft Word document, DDE-linked fields are automatically updated as their corresponding Opto 22 controller data values change. You can do the same thing with Microsoft Visual Basic or any other program that supports DDE.

Each DDE-aware application has its own set of syntactical rules to create the DDE link messages that connect it to OptoServer. This section discusses the common elements of DDE messages. Be sure to consult your DDE-aware program manuals for individual differences in DDE linking.

DDE Messages

A DDE-aware client sends a DDE message to initiate a conversation with OptoServer and to request data. Although each application has its own unique syntax to develop messages, they all consist of three common character expressions: Application, Topic, and Item.

Application

The application is simply the name of the server supplying the data information. OptoServer uses MDS for its name. Actual string expressions depend on your DDE-aware application's syntax and what node OptoServer is running on relative to the DDE-aware application.

Topic

A topic expression identifies a category of data from the application. For OptoServer, you should generally use the topic expression OPTO_MDS_0. Topic names are not case-sensitive, but note that they contain underscores rather than spaces. Remember to include underscores in your topic expressions.

If you are working across a network, the topic has the syntax: <topic>$, so the topic would be OPTO_MDS_0$.

NOTE: OptoServer also creates topics based upon the controller information you have set up. These topics will be in the following format:

OptoCtrl.ControllerName

where ControllerName is the name you supplied for the controller when it was configured.

Item

The item expression identifies a data item from an OptoControl strategy. The format for an OptoControl DDE item has the following syntax in all applications:

ControllerName[RefreshGroupName]:ItemType.ItemName[start-end].Field.BITn

Each parameter is described in the Item Parameters table on the following page.

ControllerName is normally included. However, if you need to swap controllers, for example to shift to a backup controller, you can leave the controller name out of the item expression. If it is left out of the item expression, OptoServer looks for the controller name as part of the topic expression.

RefreshGroupName, ItemType, and **ItemName** must always be included.

The **[start-end], Field,** and **BITn** parameters are applicable to some data types only. The Item Types table starting on page 3-4 describes item types in detail.

NOTE: The ItemName must be defined in all capital letters in the OptoControl strategy.

Item Parameters

Parameter	Description
ControllerName	The name of the controller to scan for data. This parameter is configured in the OptoServer Administrator with the Configure Controllers command. This parameter is normally included in the item expression, but it does not have to be. If it is not included in the item expression, OptoServer looks for it as part of the topic expression.
[RefreshGroupName]	The scan rate group for a data item. This parameter is required when a DDE-aware client requests data from OptoServer. This parameter is configured in OptoServer Administrator. (See page 2-8.)
ItemType	Defines the data type of the item requested. Valid ItemTypes are defined in the Item Types table on page 3-4. The identifier used in the message is listed in the ItemType column.
ItemName	The actual data item's name in the OptoControl strategy.
[start-end]	Applies only to data items of type float table or integer table, and indicates the range of elements for ItemNames of these types. "Start" is the first element in the range and "end" is the last element in the range. Single table elements can be requested by specifying only a start parameter. Up to 50 elements can be specified in one request, so you must limit the start-end range to request only 50 elements (0–49, 101–150, and so on). Only one element from a string table may be requested at a time. See "Changing the Poke Order" on page 2-10 for information on the order in which elements are poked to tables.
Field	Applies only to data items with more than one value associated. For example, a PID loop item type has a setpoint, a gain, a derivative, and many other related fields. Refer to the "Field" column in the Item Types table for an item type's applicable fields.
BITn	Applies only to items of type integer and integer table elements. It is the literal character string "BIT" followed by a number between zero and 31, inclusive (for example, BIT28).

Item Types

The following table shows supported item types and fields for the Item expression.

NOTE: This table spans several pages.

Description	Item Type	Field	Actual Base Type	Access
32-bit Integer[1]	I	None	integer	R/W
Float	F	None	float	R/W
String	S	None	string	R/W
Timer	T	None	float	R/W
32-bit Integer Table	IT	[start-end][2]	integer table	R/W
		[element]	integer	R/W
Float Table	FT	[start-end][2]	float table	R/W
		[element]	float	R/W
String Table	ST	[element]	string	R/W
Digital Simple I/O Unit (G4D16LS)	DIOS	Enable	discrete	R/W
Digital Multifunction I/O Unit (B100, B3000, B3000-HA, G4D16R, G4D16L)	DIOM	Enable	discrete	R/W
Analog Multifunction I/O Unit (B200, B3000, B3000-HA, G4A8R, G4A8L)	AIO	Enable	discrete	R/W
Digital Remote Simple I/O Unit (SNAP-BRS, G4D32RS)	DIORS	Enable	discrete	R/W
Digital and Analog Mixed I/O Unit (SNAP-B3000-ENET)	MIX	Enable	discrete	R/W
Digital-only Ethernet I/O Unit (SNAP-ENET-D64)	D64	Enable	discrete	R/W
Analog Input Point	AI	Value	float	R
Analog Output Point	AO	Value	float	R/W

[1]If you are using 64-bit integers in OptoControl, convert them to two 32-bit integers using the commands Get High Bits of Integer 64 and Get Low Bits of Integer 64.
[2]Table range is limited to 50 elements.
[3]OptoControl chart "state" values are as follows: (-3) Waiting for I/O, (-1) Start, (0) Stop, (1) Suspend.

Description	Item Type	Field	Actual Base Type	Access
PID Loop	PID	Input	float	R
		Output	float	R/W
		Setpoint	float	R/W
		Gain	float	R/W
		Integral	float	R/W
		Derivative	float	R/W
		Process Variable	float	R/W
		Setpoint Max	discrete	R/W
		Setpoint Min	discrete	R/W
		Input Range	discrete	R/W
		Activate	discrete	R/W
		Auto	discrete	R/W
		Output Enable	discrete	R/W
		Output Track	discrete	R/W
		Host for Process Variable	discrete	R/W
		I/O for Setpoint	discrete	R/W
		Average Input	discrete	R/W
Digital Simple Input Point	DIS	State	discrete	R
Digital Multifunction Input Point	DIM	State	discrete	R
Digital Remote Simple Input Point	DIRS	State	discrete	R
Counter	CNT	State	discrete	R
		Counts	integer	R
Quadrature Counter	QUAD	State	discrete	R
		Counts	integer	R
On Time Totalizer	TOTON	State	discrete	R
		On Time Total	float	R
Off Time Totalizer	TOTOFF	State	discrete	R
		Off Time Total	float	R

[1]If you are using 64-bit integers in OptoControl, convert them to two 32-bit integers using the commands Get High Bits of Integer 64 and Get Low Bits of Integer 64.
[2]Table range is limited to 50 elements.
[3]OptoControl chart "state" values are as follows: (-3) Waiting for I/O, (-1) Start, (0) Stop, (1) Suspend.

Description	Item Type	Field	Actual Base Type	Access
On Pulse Measurement	PULON	State	discrete	R
		On Pulse Measure	float	R
Off Pulse Measurement	PULOFF	State	discrete	R
		Off Pulse Measure	float	R
Frequency Measurement	FREQ	State	discrete	R
		Frequency	integer	R
Period Measurement	PERIOD	State	discrete	R
		Period	float	R
Digital Simple Output Point	DOS	State	discrete	R/W
Digital Multifunction Output Point	DOM	State	discrete	R/W
		On Time Percent	float	R/W
		Period	float	R/W
Digital Remote Simple Output Point	DORS	State	discrete	R/W
Digital TPO Output Point	TPO	State	discrete	R/W
		On Time Percent	float	R/W
		Period	float	R/W
Digital Event/Reaction	ERD	Scan Enable	discrete	R/W
		Has Occurred	discrete	R
		Is Occurring	discrete	R
Analog Event/Reaction	ERA	Scan Enable	discrete	R/W
		Has Occurred	discrete	R
		Is Occurring	discrete	R
Chart	CHART	Run	discrete	R/W
		Stop	discrete	R/W
		Suspend	discrete	R/W
		Continue	discrete	W
		State[3]	integer	R/W

[1]If you are using 64-bit integers in OptoControl, convert them to two 32-bit integers using the commands Get High Bits of Integer 64 and Get Low Bits of Integer 64.
[2]Table range is limited to 50 elements.
[3]OptoControl chart "state" values are as follows: (-3) Waiting for I/O, (-1) Start, (0) Stop, (1) Suspend.

Description	Item Type	Field	Actual Base Type	Access
Controller	CTRLR	Free Memory	integer[1]	R
		Time Stamp	string	R
		Date Stamp	string	R
		Time/Date	string	R
		Filename	string	R
		# of Errors	integer[1]	R
		Current Error	integer[1]	R

[1]If you are using 64-bit integers in OptoControl, convert them to two 32-bit integers using the commands Get High Bits of Integer 64 and Get Low Bits of Integer 64.
[2]Table range is limited to 50 elements.
[3]OptoControl chart "state" values are as follows: (-3) Waiting for I/O, (-1) Start, (0) Stop, (1) Suspend.

NetDDE Messages

OptoServer automatically starts NetDDE on the server PC if it is not already running, and NetDDE remains running when OptoServer is closed. If the client is on a different PC (a different network node), you need to start NetDDE on the client computer.

NetDDE share names are slightly different in 32-bit Windows (Windows 95/98 and Windows NT) than in 16-bit Windows (Windows for Workgroups, for example). Because 32-bit Windows doesn't allow periods in the share name, the shares take the format Opto_Mds_0$ instead of $Opto_Mds_0.Dde. OptoServer creates its shares if they don't already exist. This difference affects any DDE client that uses NetDDE communications to Mds.

DDE and Case Sensitivity

Tagnames on the controller must be uppercase in order to be accessible to DDE clients. For example, a variable called MY_INT can be accessed via DDE, but My_Int cannot. The reason is that although DDE topic and item strings are **not** case-sensitive, OptoControl **is** case-sensitive. Since OptoServer must make an assumption about the case of a tag, it assumes that tags are uppercase. In other words the DDE expression

```
=MDS|OPTO_MDS_0!'MyRtu[Group 0]:I.My_Int'
```

would actually access an integer called MY_INT.

DDE expressions are not case-sensitive, which means that the application, topic, and item may be upper, lower, or mixed case.

Visual Basic and OptoServer

You can also use OptoServer to update your Visual Basic applications with controller information. This section discusses the Visual Basic programming elements used in a sample program provided with OptoServer, which demonstrates how to poke and request controller information into a Visual Basic program by using a timer. The example is written for Visual Basic 5.0.

Go through the next section to open and view the main components of the sample program. For specific details about DDE linking with Visual Basic, consult your Microsoft Visual Basic manual.

Linking Visual Basic and OptoServer

1. Follow the steps in "Downloading a Strategy to the Controller and Verifying Communication" on page 1-8 to verify that your controller and OptoControl strategy are running properly.

2. Also follow the steps in "Using OptoServer Administrator to Configure a Controller" on page 1-9, but before closing the OptoServer Administrator, configure a Refresh Group name for use by the DDE-aware client. (See "Setting Refresh Times" on page 2-8 for an explanation of the dialog box.)

3. Close OptoServer Administrator.

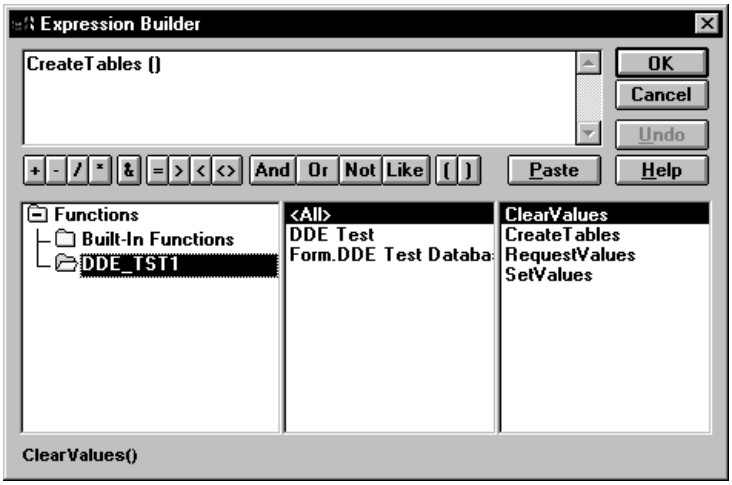
4. Start OptoServer (Mds.exe) and verify that your controller is attached to OptoServer.

5. Start Visual Basic and open the OptoSrvr\Examples\Vb5\Dde_tst1.vbp example.

6. To run the program, choose Run→Start.

   When you start running the Dde_tst1.vbp program, start-up code found in the Form_Load event for the main form, DDE_TST1.FRM, is executed. A DDE warm link (a Visual Basic Notify) is established to OptoServer and a program timer is initialized. Notice that the form

changes slightly and does not display the Poke and Request objects that were in the upper-right quadrant of the form. The Program Status displays the message "Stopped."



7. From the Poking menu, choose Start.

   The project begins and the Program Status changes to "Waiting." Values are poked out to the controller and then read back. The Item Names and Values are displayed along with changes to their respective bar graphs. You can change the Poke Interval to increase or decrease the time between pokes and requests.

8. To stop the example, choose Poking→Stop.

You've now run the sample Dde_tst1.vpb program that makes basic DDE pokes and requests from a controller and updates a Visual Basic form.

Viewing the Main Components of the Visual Basic Sample Program

To take a closer look at the objects associated with the Visual Basic program, we'll start by viewing the contents of the form. A form is a collection of objects, each with associated Visual Basic code that can be viewed by double-clicking the object. The View Form button displays the .frm file, and the View Code button displays Visual Basic code for project components.

1. After running the sample program, go back to the design programming environment by choosing Run→End.

   The DDE Test Program form is displayed for editing or viewing.

2. Double-click the timer graphic in the upper-right section of the form.

   The code window for this object appears. Most of the Visual Basic code for this example is found in this object's code module (DdePokeTimer).

3. View the code by scrolling through it. Click the Object drop-down list to see other code modules and objects. Close the code window.

4. Double-click other objects displayed in the form.

   Each object's code window is displayed. Notice that the Properties window shows information about the selected object. Close each Code window with its control-menu box.

5. Click the Request text box.

   This object senses changes to the OptoServer data (warm link) and requests the new data from OptoServer about the controller. Data is returned in a comma-delimited form. The code parses the information and displays it in the text boxes on the form. It also changes the message displayed in the Program Status text box.

CHAPTER 4

OptoServer and OPC

Introduction

This chapter discusses how to use OptoServer to communicate with other OPC-compliant applications. OLE for Process Control (OPC) is a standard specifically designed for control applications. It uses OLE (Object Linking and Embedding) technology for fast data exchange and increased compatibility among servers and clients from different vendors. OptoServer supports OPC Specification 1.0 clients.

In This Chapter

General OPC Concepts 4-1
Creating Client Links 4-3
Running a Sample OPC Client..... 4-5

General OPC Concepts

What Is OPC?

OPC is a technology that defines standard objects, methods, and properties for communication among field devices, their servers, and the software applications that use their information. These applications can include both automation and control software, such as OptoServer, and business and office software.

Traditionally, software vendors have provided specialized drivers to communicate with the varied hardware on the market. Since there has been no common standard, each software driver is specific to a piece of hardware and doesn't work for any other piece. When the hardware changes, the software vendor must choose whether to modify the driver to match. Drivers typically address basic functions and don't necessarily utilize all the features of the hardware.

Hardware vendors traditionally don't produce drivers, even though they know about the special features of their hardware and how best to access the information that hardware produces. If

they did produce drivers, each piece of hardware would have to have multiple drivers, one for each specific software application used with it.

OPC is designed to do two things:

- First, create a common standard so all communication between software and hardware is in the same language.
- Second, move driver creation to the hardware manufacturer, who best understands the hardware's capabilities.

OPC technology has several advantages over DDE: OPC is quick, robust, designed for networks, and has a standard message syntax for all clients.

As the OPC standard gains wide support among developers, you will be able to choose among a wide selection of products, applications, and tools from different vendors, with the confidence that they will all work together seamlessly.

Example of OPC in Action

Without OPC: You want to use another vendor's human-machine interface (HMI) with an Opto 22 controller. You cannot use the HMI software unless it has a driver written specifically for Opto 22.

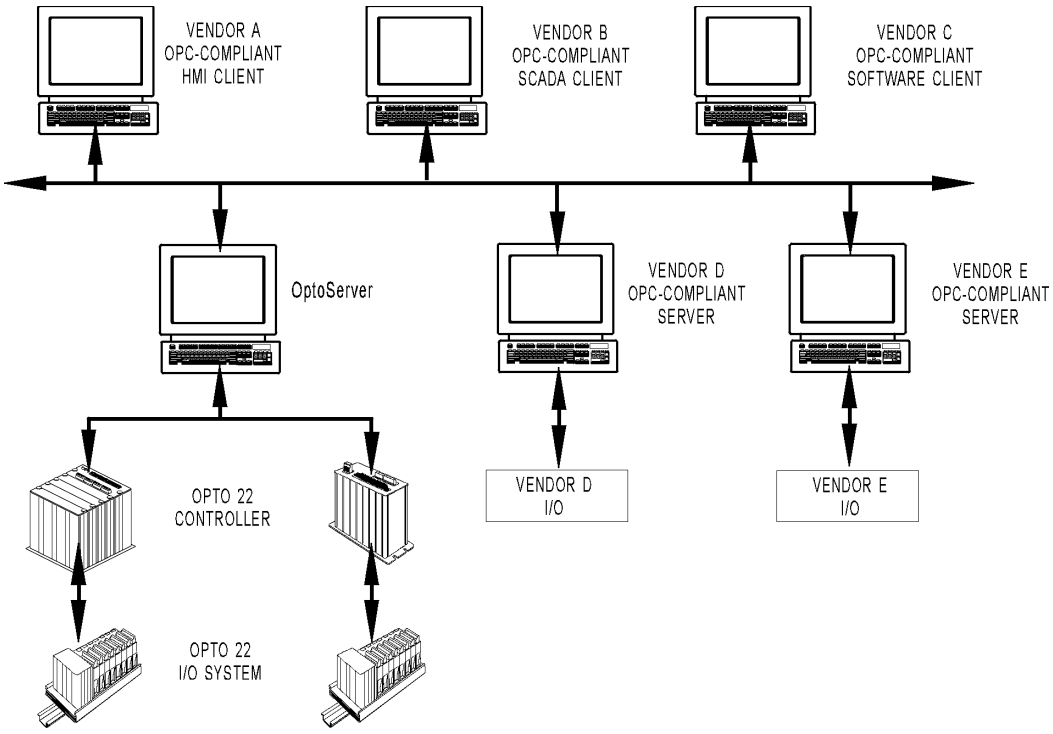
With OPC: If the other vendor's software is OPC 1.0-compliant, you don't need a separate driver. For example, suppose you have an Opto 22 controller running an OptoControl strategy. Since OptoServer is OPC-compliant, it can retrieve that data and provide it to the OPC client.

The OPC Specification

The OPC Foundation, a non-profit group, released the first OPC specification in August 1996, and OptoServer supports clients compliant with the 1.0 specification. The initial specification's scope concentrates on basic data acquisition. It does not address historical data handling, alarming, or security. The specification provides the following interfaces:

- A fast, efficient custom COM interface for data exchange between plant-floor servers and OPC clients, using a compiled language such as C or C++.
- A simplified and somewhat slower OLE Automation interface (on top of the COM interface) for accessing data within any OPC-compliant server using programs in Visual Basic, Delphi, and other languages that support OLE.

OPC supports a distributed architecture, allowing clients and servers to reside on different machines, transparently. The following figure illustrates a network using OPC and OptoServer.



Creating Client Links

The OPC client communicates with the server through standard links you create. Unlike DDE, OPC syntax rules do not vary by client.

The client link consists of three parts, or expressions: Server, Access Path, and Item ID. These expressions are basically equivalent to the DDE message expressions Application, Topic, and Item, explained in Chapter 3.

Server

The first part of the client link is simply the name and location of the server.

- **Name**—The OPC program ID is Opto22.Mds.1. It will probably appear in a drop-down menu or list box.
- **Location**—If the server you want to talk to is local (on the same machine), leave the Node Name field blank. If the server you want to talk to is remote (on another machine), enter the name of that machine in the Node Name field.

Access Path

The second part of the client link dictates the route that a server should take to get to the data requested. For OptoServer, you should normally use OPTO_MDS_0.

The access path is not required by OptoServer, however. If you are using a third-party software package that does not have a way to set it, it can be left out.

OptoServer will also create topics based upon the controller information you have set up. These topics will be in the following format:

OptoCtrl.ControllerName

where ControllerName is the name you supplied for the controller when it was configured.

Item ID

The third part of the client link is a string that pertains to the specific piece of data you're requesting. The string normally includes the controller name, scan rate, item type, item name, and additional fields, depending on the item you're accessing.

NOTE: The item name (or tag name) must be in all uppercase, and you must have already defined it in the OptoControl strategy. OptoControl requires all uppercase letters.

Item ID String Format

```
ControllerName[RefreshGroupName]:ItemType.ITEM_NAME[start-end].Field.BITn
```

Item ID String Samples

```
Mistic1[Group 0]:F.GEN_FLOAT_00
Mistic1[Group 0]:I.GEN_INT_00
[Group 0]:DIM.D_IN1.State
```

NOTE: If the Item ID string does not contain the controller name, OptoServer will look for it in the Access Path.

For details about the format of the Item ID string, see the Item Parameters table on page 3-3 and the Item Types table starting on page 3-4. Parameter descriptions and items supported are the same for DDE and OPC.

Also read "Setting Refresh Times" on page 2-8 and "Optimizing OptoServer Scanning" on page 2-5. These sections apply to OPC-compliant applications as well as to other OptoServer clients.

Running a Sample OPC Client

This section describes the basics of setting up OptoServer to provide information to an OPC client. In a typical setup, OptoServer and the OPC client would probably be running on different computers attached to the same network; but for this example we'll run them on the same computer. These are the steps we will follow in this section:

- Use OptoControl to download a strategy to the controller and verify communication.
- Use the OptoServer Administrator to configure a controller attached to the computer running OptoServer.
- Start OptoServer so that it is ready to be accessed by the OPC client.
- Start the OPC client and create client links.

Downloading a Strategy to the Controller and Verifying Communication

1. Start OptoControl.
2. From the File menu, choose Open Strategy. Navigate to Opto 22\FactoryFloor\OptoSrvr\Examples\OptoCtrl and open the sample strategy dde_test.cdb. (If OptoServer was not installed in the default directory, your directory will be different.)

   This strategy can be used to demonstrate an OPC client as well as a DDE client.
3. Configure the strategy for your controller's connection, address, and port settings, and enter "mistic1" as the controller's name.

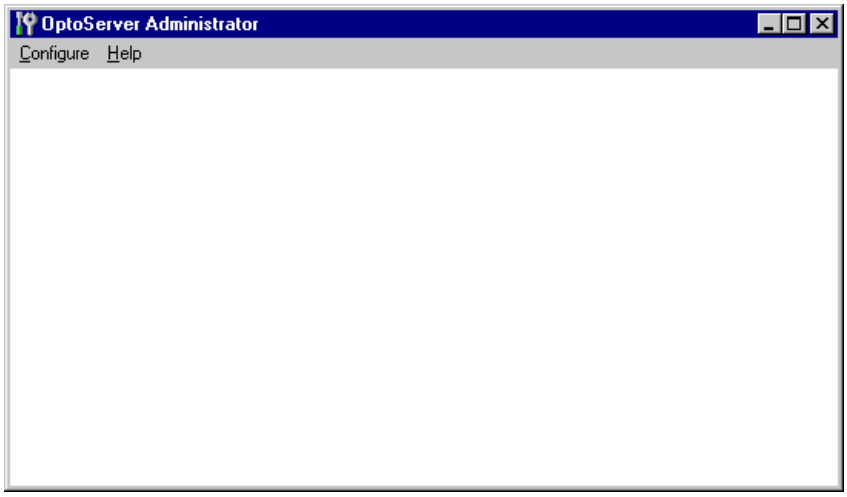
   If you need help, see "Configuring Controllers" in the *OptoControl User's Guide*.
4. Compile the program.
5. Change to the Debug mode and run the program.
6. Verify that the controller is communicating with your PC. Observe whether the controller's host port LED (ARCNET, COM0, etc.) flashes in response to messages from the PC.

   If your controller is responding to your PC with no errors, you're ready to move on to the next step. If you're having problems getting your controller to respond to the OptoControl strategy, make sure the configuration setup and cable wiring between the controller and PC are correct. Consult the *OptoControl User's Guide* and your controller manual to help you troubleshoot the problem.
7. When the controller is communicating with the PC, leave the strategy running and exit OptoControl.

Using OptoServer Administrator to Configure a Controller

1. Start OptoServer Administrator by clicking the Start button and selecting Programs→Opto 22→FactoryFloor 4.0→OptoServer→OptoServer Administrator.

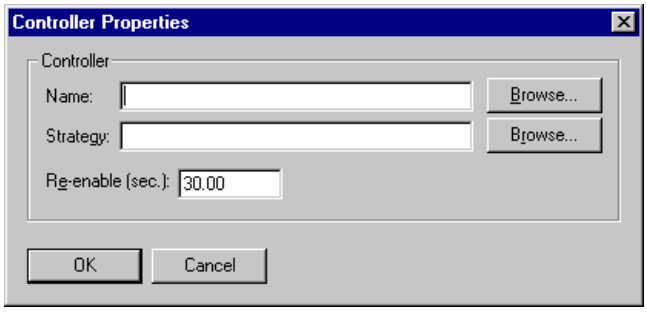
   The OptoServer Administrator main window appears:



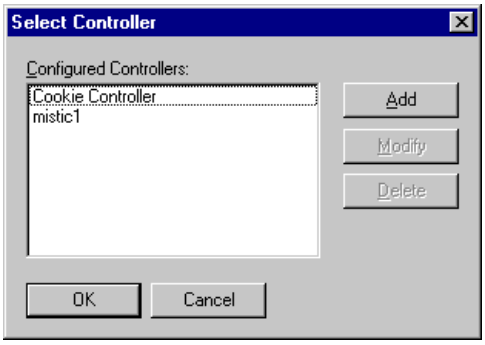
2. Select Configure→Controllers.

   If this is the first time a controller is being configured in OptoServer Administrator, a message about an INI file pops up. Click OK to continue. The necessary file is created.

3. In the Controllers dialog box, if mistic1 is already listed as a controller, skip to step 8. If it is not listed, click the Add button to add a controller.



4. Click the Browse button to choose a controller from the Select Controller dialog box.

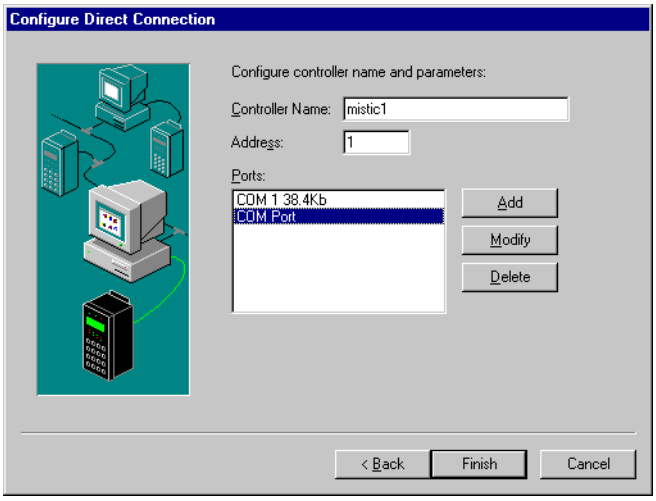


5. Click the mistic1 controller name you set up in the OptoControl strategy. Click Modify to check the controller's configuration.

   The type of connection should be shown as Direct.

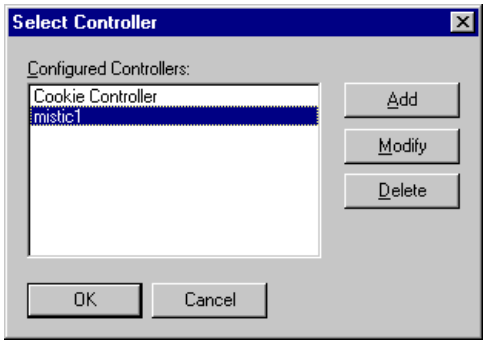
6. Click Next.

   The Configure Direct Connection dialog box appears, with the mistic1 controller listed in the Controller Name box.



7. If necessary, change the controller's address in the Address box. Highlight the port for direct connection to your controller. If you need to add a port, click Add. (For help, see "Configuring Controllers" in the *OptoControl User's Guide*.) When the address and port are correct, click Finish.

The newly configured controller appears in the Select Controller dialog box.

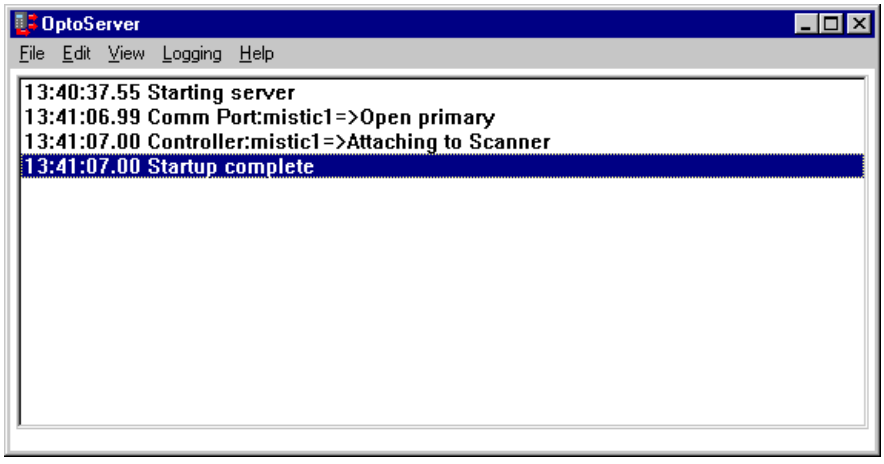


8. Click the mistic1 controller to highlight it, and click OK.
9. Click OK to close any open dialog boxes.
10. Set scan rates if you wish by following the instructions in the section "Setting Refresh Times" on page 2-8. Then return to the next step.
11. Exit OptoServer Administrator by clicking the close box.

Starting OptoServer

1. Click the Start button and select Programs→Opto 22→FactoryFloor 4.0→OptoServer→OptoServer.

   The OptoServer main window appears:



   Your screen may show OptoServer attaching to other controllers in addition to mistic1, if you have configured others in OptoServer Administrator.

2. Click the Logging menu and make sure the following logging options are checked:
   - Log to Window—The main window displays messages.

- Log Level Normal—Only significant OptoServer communication events are recorded.
- Log with Time—Messages are saved with a time stamp.

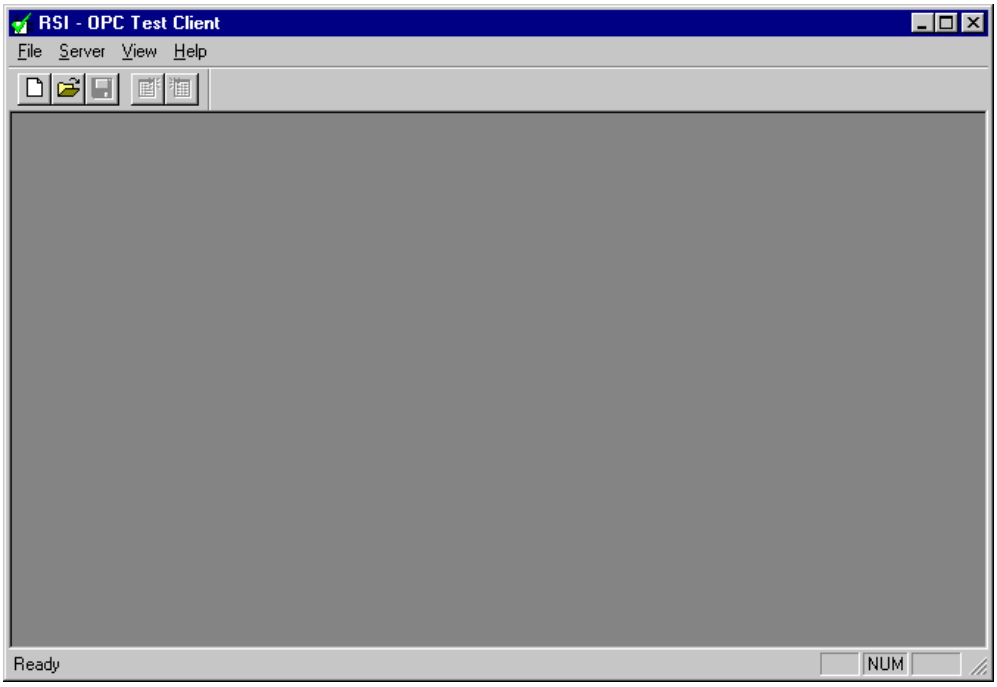
3. Click the minimize button to reduce the OptoServer window to an icon.

Starting the OPC Client

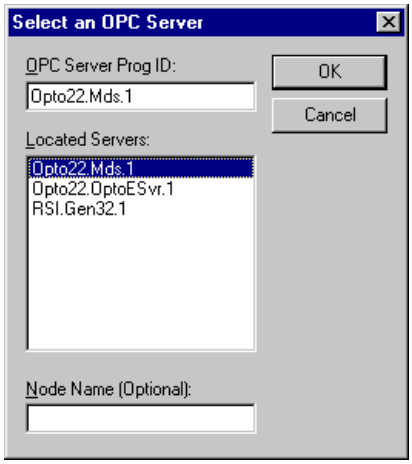
1. From the Start menu, choose Programs→Opto 22→FactoryFloor 4.0→OptoServer→OptoServer OPC Test Diagnostic.

   If you receive an error message about a file that's missing, can't be found, or is invalid, see "If You Are Running Windows 95" on page 4-12.

   The client's main window appears:



2. From the Server menu, choose Connect.

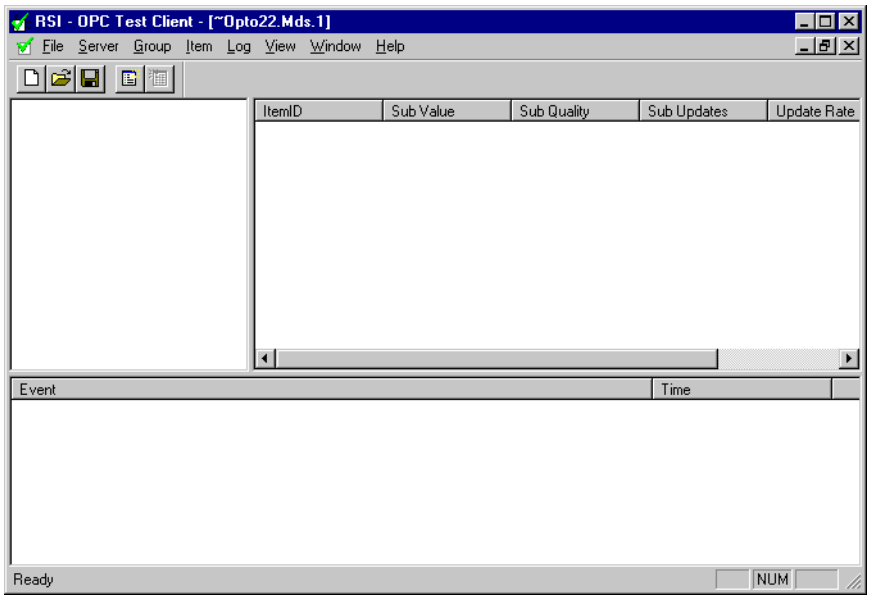


If OptoServer is already running, Opto22.Mds.1 appears in the list. If OptoServer is not already running, the client automatically starts it. If the server does not appear in the list, you can type its name in the OPC Server Prog ID field.

NOTE: In this example, OptoServer is running on the same computer as the OPC client, so you would leave the Node Name field blank. To run OptoServer on a different computer, you must first configure DCOM to recognize the other computer. See "If You Are Running OptoServer and an OPC Client on Different Computers" on page 4-13. Then in the previous figure, you would enter the name of the computer running OptoServer in the Node Name field.

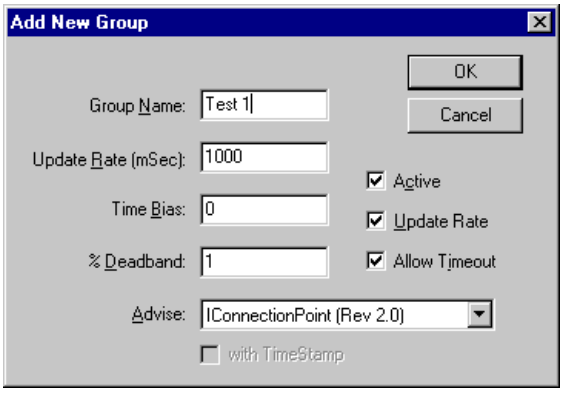
3. Highlight Opto22.Mds.1 and click OK to connect to OptoServer.

You return to the client's main window.



4. From the Group menu, choose Add Group.

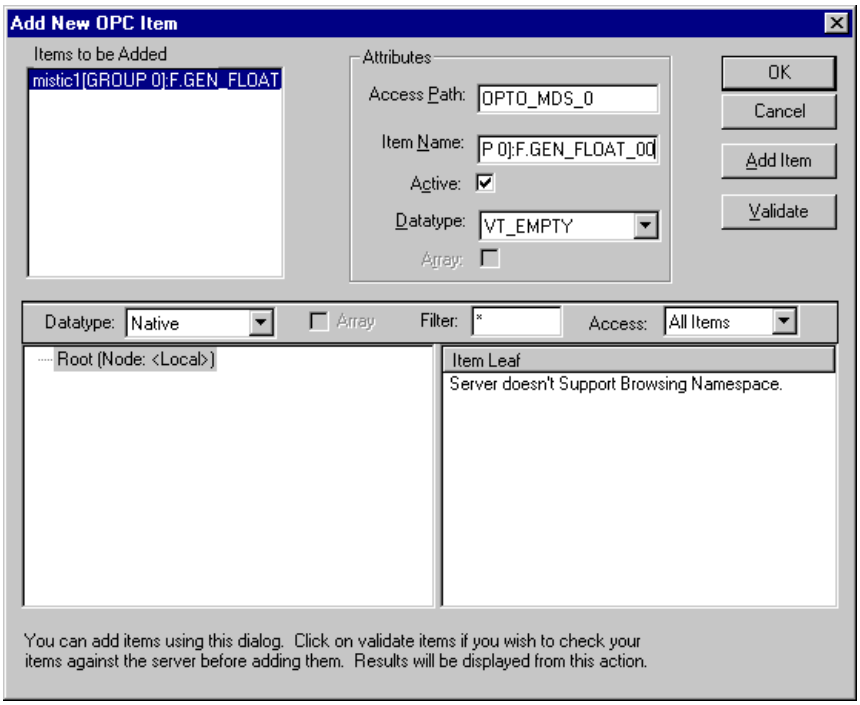
   The client requires that you designate a "group" for the items the client is requesting (usually I/O points or variables). This group has no relationship to groups you may have set up in the Refresh Times dialog box.



5. Type in a Group Name (if the client requires it) and click Update Rate to put a check in the box, as shown in the previous figure. Click OK.

   The new group appears in the main window.

6. From the Item menu, choose Add Item.



7. In the Access Path field, type OPTO_MDS_0 as shown in the figure. In the Item Name field, type the following:

```
mistic1[GROUP 0]:F.GEN_FLOAT_00
```

What you just typed reflects the format for the Item ID, described in detail on page 4-4:

```
ControllerName[RefreshGroupName]:ItemType.ITEM_NAME[start-end].Field.BITn
```

Note, however, that the client inserts the apostrophes for you, so you don't have to type them. In this example, we've used the default name for the RefreshGroupName. If you entered a different name for the refresh group, use the name you entered instead of GROUP 0.

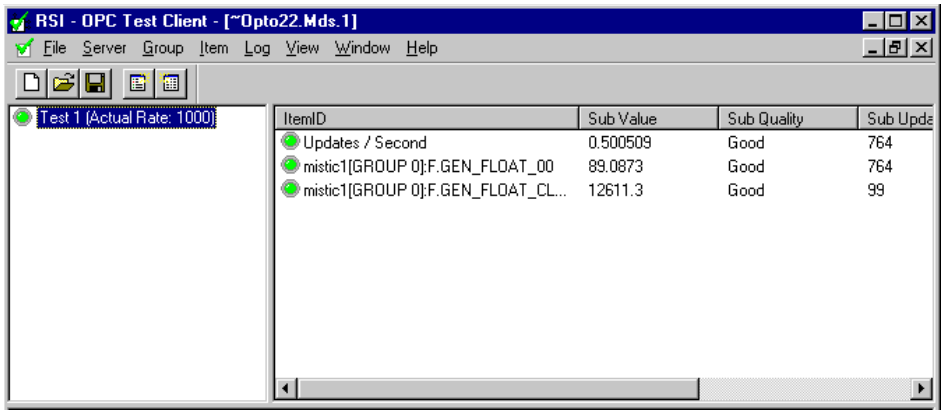
For the GEN_FLOAT_00 variable in this example, [start-end], Field, and BITn are not applicable.

8. When you have entered the Access Path and the Item Name, click the Add Item button.

   The item is added and the Item Name field is cleared. You can add another item the same way if you wish.

9. When you have finished adding items, click OK.

   The main window shows the items you have added. The following figure shows two items, GEN_FLOAT_00 and GEN_FLOAT_CLOCK, which are both variables from the strategy:



The sample connection is complete! You can watch the items being updated at the refresh rate you specified.

If You Are Running Windows 95

If you are running OptoServer on Windows 95, read this section.

You must have installed distributed COM (DCOM) in order to run OPC. DCOM comes standard with Windows NT 4.0 and Windows 98 and is available as an add-on for Windows 95. DCOM also comes with Internet Explorer 4.0. The DCOM package can be obtained from Microsoft's Web site at www.microsoft.com/com/dcom95.

If you are running OptoServer and an OPC client on different computers that are networked, rather than on the same computer, install DCOM on both computers. Additionally, you must install the DCOMcnfg program. It is also available from the Microsoft Web site.

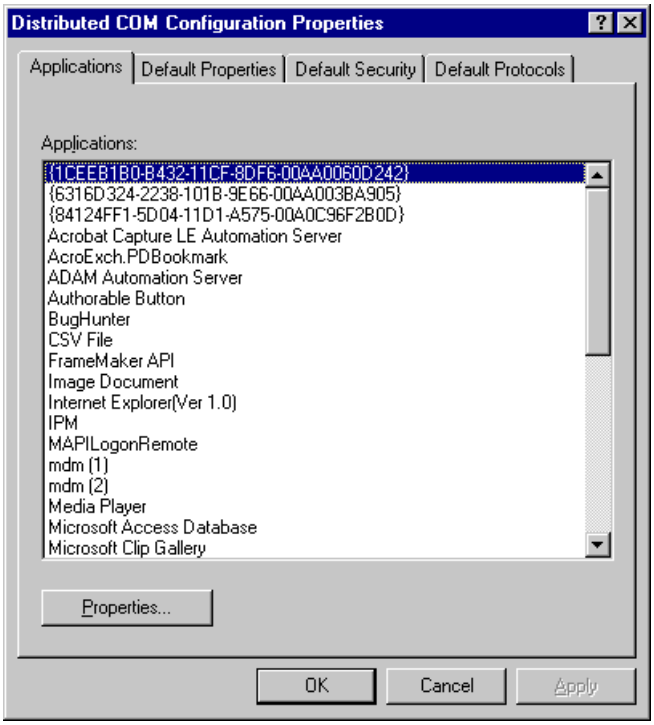
Also note that if you are running OptoServer on a Windows 95 computer and the OPC client on a separate computer, you must manually start OptoServer. The client does not start it remotely.

If You Are Running OptoServer and an OPC Client on Different Computers

If you are running OptoServer and an OPC client on two separate networked computers, you'll need to configure DCOM to recognize the computer running OptoServer.

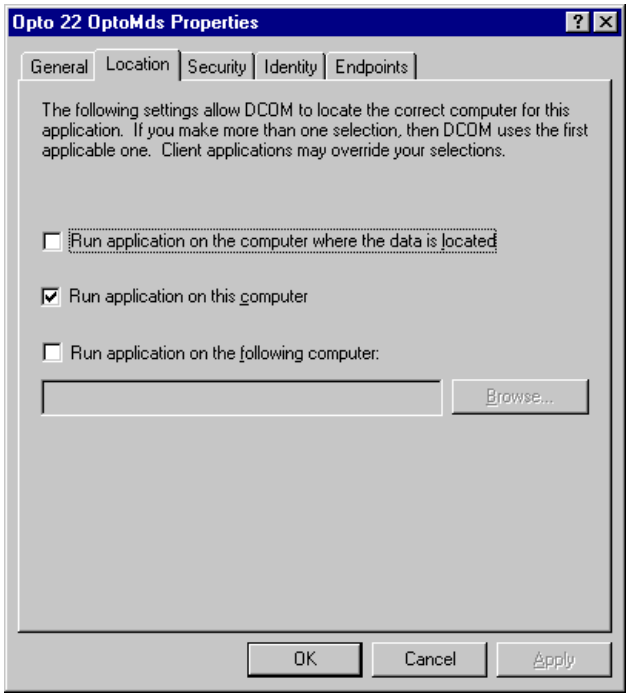
1. On the client computer, open Windows NT Explorer (Windows Explorer on Windows 95 or Windows 98) and navigate to the WINNT\system32 directory (Windows\System directory on Windows 95 or Windows 98). Locate DCOMcnfg.exe and double-click it to execute the program.

   The Distributed COM Configuration Properties window appears:



2. Scroll down and double-click Opto 22 OptoMds.

3. When the Properties window opens, click the Location tab.


Opto 22 OptoMds Properties
General
Location
Security
Identity
Endpoints
The following settings allow DCOM to locate the correct computer for this application. If you make more than one selection, then DCOM uses the first applicable one. Client applications may override your selections.
Run application on the computer where the data is located
Run application on this computer
Run application on the following computer:
Browse...
OK
Cancel
Apply

4. Check the box next to *Run application on the following computer*. Type in the name of the computer that will be running OptoServer, or click the Browse button (if available) to locate the computer. When the computer's name appears in the field, click OK.

5. Click OK in the window to exit DCOMcnfg.

DCOM is now configured to recognize the computer running OptoServer. When you start the client and connect to the server, make sure to type the computer name in the Node Name field. See the figure on page 4-10 for an example of a client dialog box requesting Node Name. If you leave the Node Name field blank, the server defaults to the local computer.

Also note that if you are running Windows 95 on the OptoServer computer, you must start OptoServer manually. The client does not automatically start a remote server.

APPENDIX A

OptoServer Troubleshooting

Introduction

If you have problems while running OptoServer, check the troubleshooting tips in this appendix and also the messages starting on page A-5. For help on using OPC clients with OptoServer, see "Problems Using OPC" on page A-4. To display additional diagnostic messages that may help troubleshoot your system, choose Logging→Log Level Diagnostics in OptoServer. For additional help, call Opto 22 Product Support. See page ix for a list of service phone numbers.

Communication Problems

If you are a Windows NT user and are experiencing communication problems that are indicated by the errors listed below, first try rebooting your machine to ensure that all port configurations have been correctly registered with the operating system.

- "Invalid port error. WinRT drivers might not have started."
- "Invalid protocol error."
- "Port setup invalid."
- "Could not find other nodes in ARCNET."

If you are using ARCNET, make sure there are no Windows 95 or Windows NT network drivers configured to use the ARCNET card. These drivers conflict with Opto 22 ARCNET drivers.

You can use OptoTerm to test communication to controllers. When OptoTerm starts, it displays a list of controllers configured on your computer. Double-click a controller name to display a status dialog box. For more information about OptoTerm, see the Troubleshooting appendix in the *OptoControl User's Guide*.

Network Communication

To troubleshoot DDE communications between OptoServer and a DDE-aware client, try swapping out the server or the client with another DDE-aware client such as Word or Access. Example: OptoServer and a Visual Basic client are not "talking" to each other. If swapping out Visual Basic with Access shows communication is fine between Access and OptoServer, there may be a problem with the Visual Basic application.

View the OptoServer main log window to see OptoServer transaction and error messages. Select Logging→Log Level Diagnostics to display all messages sent to and received from clients. Messages displayed under Log Level Normal conditions are explained starting on page A-5.

To see if a client is attached to OptoServer, choose the OptoServer command View→Clients. The Client List dialog shows an eight-digit client handle number for each connected DDE-aware client, and the node name for each connected OptoDisplay client.

To view communication exchanges at the controller level, run the OptoSniff utility that's included with FactoryFloor. From the main window, choose the File→Enable Sniff command. Anything sent or received by the controller is displayed in the main window. You can also use the utility as a terminal emulator to send and receive from the controller. For more information on OptoSniff, see the Troubleshooting appendix in the *OptoControl User's Guide*.

To verify that a DDE-aware client works with OptoServer, download a simple OptoControl strategy to the controller and see if the client is being updated by OptoServer. An example of a simple OptoControl program is a one-chart, one-variable program that increments the variable in an infinite loop.

Make sure you do not install a Windows network driver on the ARCNET card in your PC at the time you install a Windows programming environment. Operating systems such as Windows 95 and Windows NT automatically try to install a network driver on an ARCNET card. Allowing the driver to be installed can produce unpredictable results from OptoServer.

Verify that the "Retries" port parameter is not masking other problems. Set the retries parameter to zero and find out exactly what happens by analyzing whether OptoServer is not responding, whether there are long delays, or whether it's getting a sequence I/O error.

Verify that there are no Windows Control Panel COM port conflicts. Make sure there are no conflicts between the ports configured in the Windows Control Panel and in OptoServer. Check that the address IRQ settings are unique for each port and that they match the settings used in OptoServer Administrator. If communication problems with OptoServer remain, try using OptoTerm. (See the Troubleshooting appendix in the *OptoControl User's Guide* for information on OptoTerm.)

Lengthen timeout per port. This action should help eliminate some of the common error messages.

Understanding Timeout, Retries, and Re-enable Settings

OptoServer polls controllers sequentially, which means that it normally waits for a response before sending out another command. If the controller does not respond within the timeout period, the retries number determines how many times OptoServer will try again. If all the tries fail, you receive a timeout error, and OptoServer checks the re-enable setting to see how soon to try communicating with the controller again.

For example, if the timeout period is set to 3 seconds, retries are set to 1, and the re-enable setting is 30 seconds, here's what will happen:

> *OptoServer polls the controller and waits for a response. If it does not receive a response within 3 seconds (timeout period), it polls the controller again (one retry). If it still doesn't receive a response, you see a timeout error. OptoServer waits for 30 seconds (the re-enable setting), and then starts the sequence over again.*

During the timeout/retry cycle, OptoServer does not communicate with any other controllers. The computer may become sluggish or unresponsive, making it difficult to access menu options and other applications. During the re-enable period, the system returns to normal: OptoServer polls other controllers, and the computer functions normally. Therefore, if the timeout period is long, if the retries number is large, or if the re-enable period is too short, system performance may suffer during communication problems.

Timeouts, retry numbers, and re-enable periods are set when you configure the controller. For timeouts, the best values to use depend on your method of communication. Timeout values that are too short result in unnecessary retries; timeout values that are too long cause unnecessary delays when there are communication problems. The following table shows basic guidelines:

Communication Method	Timeout Value
ARCNET	1–2 seconds
Ethernet	3–5 seconds
Serial at 115.2 Kbaud	2–3 seconds

The default of one retry is reasonable unless the communications link is susceptible to errors or noise, as with some modems.

The re-enable period should generally be set no less than 30 seconds (the default). If OptoServer is polling multiple controllers, set the re-enable period for each controller long enough to allow normal polling of the other controllers in case one goes offline.

Problems Using OPC

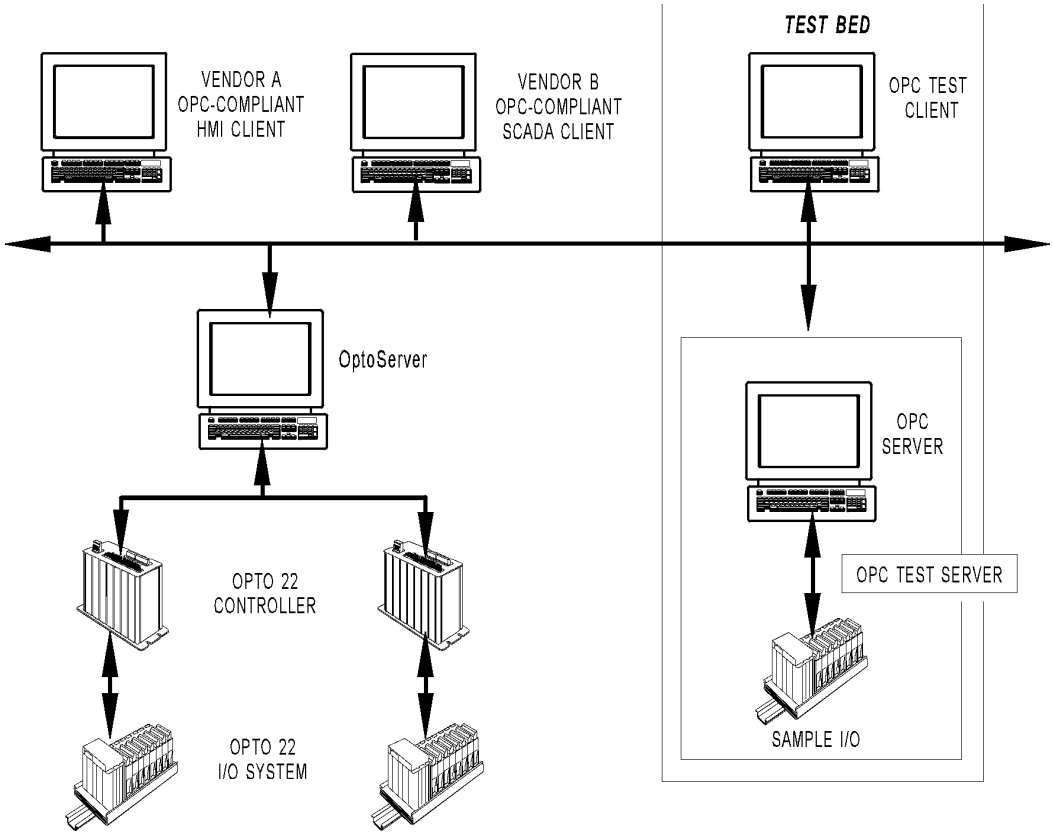
Necessary Files

You must have DCOM installed to run OptoServer. If you are running Windows 95 and have OptoServer and the OPC client on different computers, you must also install the DCOM configuration utility, DCOMcnfg.exe. See "If You Are Running Windows 95" on page 4-12 and "If You Are Running OptoServer and an OPC Client on Different Computers" on page 4-13 for more information on DCOM and DCOMcnfg.exe.

Using the Diagnostic Utilities

Included in OptoServer are two test applications: OPC Generic, a server, and OPCTest, a client. If you are having trouble connecting your client to OptoServer, you can test your client with the Generic server, or you can test the OPCTest client with OptoServer. Both the server and the client are located in the Diagnostic directory.

The following figure shows how the test bed works in relation to OptoServer.



Messages

This section describes messages that may appear in the OptoServer (Mds) log window. The Communication Data Server does not display messages except for "Initializing" and "Ready" messages that appear in the status bar at the bottom of its window.

Because these messages are from Mds, any client they refer to is an OPC or DDE client. <TagName> refers to an item or item ID expression such as MyRtu[Group 0]:I.MY_INTEGER, where MY_INTEGER is the name of a variable in a strategy on the controller MyRtu. Several messages include a <Reason>, which describes the problem in more detail to help you solve it. If you need additional help in solving errors, contact Opto 22 Product Support. (See page ix for contact information.)

Both error messages and typical transaction messages are included in this section. Messages are listed in alphabetical order.

A client has connected. <Qty> client(s are) connected. Status message indicating that a client has just connected to OptoServer and how many clients are now connected.

A client has disconnected. <Qty> client(s are) connected. Status message indicating that a client has just disconnected from OptoServer and how many clients are now connected.

Adding item/tag <TagName>. Indicates that the item <TagName> is being referenced by a client.

Advise loop start failed: <Reason> <TagName>. A hot link or report-by-exception subscription failed. Possible reasons for failure include an incorrect controller name or an invalid tag name. See <Reason> for a more detailed explanation.

Could not start <Exe>. One of the three executable files that OptoServer (Mds) automatically starts could not be started. If you don't need the file, you can ignore the message, since Mds will continue to run. If you need the file, make sure it is present. These are the three files:

- NetDDE, used for DDE links over a network. Mds starts NetDDE unless it's already running.
- OptoCds.exe, the portion of OptoServer used by OptoControl, OptoDisplay, and any other client using OptoCom.dll.
- OptoSh16.exe or OptoSh32.exe, needed to create the DDE "shares" that allow NetDDE connections to be made.

Destroy item/tag <TagName>. Indicates that the item <TagName> is no longer being referenced by any client.

Destroy topic <TopicName>. Indicates that the topic <TopicName> is no longer being referenced by any client. (An example of a topic name would be OPTO_MDS_0.)

Error adding item/tag <TagName> <Reason>. A problem occurred while a client was referencing an item. See <Reason> for a more detailed explanation.

<Exe> already running. One of the three executable files that OptoServer (Mds) automatically starts has already been started. These three files are NetDDE, OptoCds.exe, and OptoSh16.exe or OptoSh32.exe.

Failure sending <TagName> to <Qty> client(s). Data failed to reach one or more clients. May indicate an internal error. Contact Opto 22 Product Support.

New item/tag <TagName>. Appears the first time the item <TagName> is referenced by a client.

New topic <TopicName>. A client attached to the server and referenced the topic <TopicName>. (An example of a topic name would be OPTO_MDS_0.)

Poke failed <Reason> <TagName>. A client attempted to perform a synchronous write. (DDE writes are called "pokes.") This message refers to a synchronous request, not an asynchronous or hot-link request, which is a report-by-exception data transfer. See <Reason> for an explanation of the failure.

Request failed <Reason> <TagName>. A client attempted to perform a synchronous read. This message refers to a synchronous request, not an asynchronous or hot-link request, which is a report-by-exception data transfer. See <Reason> for an explanation of the failure.

Request for item/tag <TagName>. A client successfully performed a synchronous read. This message refers to a synchronous request, not an asynchronous or hot-link request, which is a report-by-exception data transfer.

Sending <TagName> to <Qty> client(s). Data is being sent to one or more clients, either by client request or as a report-by-exception.

Started <Exe>. One of the three executable files that OptoServer (Mds) automatically starts has been started. These three files are:

- NetDDE, used for DDE links over a network. Mds starts NetDDE unless it is already running.
- OptoCds.exe, the portion of OptoServer used by OptoControl, OptoDisplay, and any other client using OptoCom.dll.
- OptoSh16.exe or OptoSh32.exe, which create the DDE "shares" that allow NetDDE connections to be made.

Start item/tag <TagName>. A client has referenced the item <TagName>.

Stop item/tag <TagName>. A client has stopped referencing the item <TagName>.

Write (poke) for item/tag <TagName>. A client successfully performed a synchronous write. (DDE writes are called "pokes.") This message refers to a synchronous request, not an asynchronous or hot-link request, which is a report-by-exception data transfer.

Problems with Windows Permissions

When you set up controllers on a computer running the Microsoft Windows 2000 or Windows XP operating systems, typically you are using the computer with top-level "administrator" privileges. If someone later uses this same computer to run a FactoryFloor application, but logs in to the computer with lower-level, non-administrator privileges, the FactoryFloor application may not recognize controllers that have been previously configured.

If this problem occurs, you can modify the Windows permissions to let specific users access previously configured controllers without having administrator access. This is done using the Registry Editor utility.

WARNING: *Use the Windows Registry Editor carefully. It is strongly recommended that you make a backup copy of your Windows Registry before continuing with this procedure. Without a backup copy, if you delete the wrong properties and cannot return the Registry to its original state, application and system files can become unusable and will have to be reinstalled.*

1. From the Windows Start menu, select Run.

   The Run dialog box appears.

2. Enter the following command in the Open field and press ENTER:

   ```
   regedt32
   ```

   The Registry Editor main window appears with several open windows inside it.

3. Select the HKEY_LOCAL_MACHINE window to make it active.

4. Double-click the Software folder in the HKEY_LOCAL_MACHINE window.

5. Select the Opto22 folder.

6. Select Security→Permissions.

   The Registry Key Permissions dialog box opens. Make sure that "Opto22" appears next to Registry Key at the top of the window.

7. Click Add.

8. In the Add Users and Groups dialog box, select the name of the appropriate group or domain from the List Names From drop-down list.

9. In the Names list, select the name of the user or group that will get controller access and then click Add.

10. If it is not already selected, choose "Full Control" from the Type of Access drop-down menu.

11. Click OK.

12. In the Registry Key Permissions dialog box, select the Replace Permission on Existing Subkeys checkbox and click OK.

13. Select Registry→Exit to close the Registry Editor.

14. Restart the computer.

The user or group you added can now use controllers without having administrator access.

APPENDIX B

OptoServer Files

This appendix provides a list of OptoServer files. Use this information as a reference when you are looking through your OptoServer directory.

IC32CKIT.dll	File essential for OPC and DDE connectivity
Mdslog.log	Default name of the message logging file created by OptoServer (Mds.exe)
OptoCds.exe	Communication Data Server executable program file used to communicate to OptoControl, OptoDisplay, or any other application using OptoCom.dll, such as Microsoft Visual Basic applications you may have written
OptoCom.dll	File in the system directory necessary for communication with controllers
OptoErr.dll	File in the system directory that contains a list of error numbers and messages
OptoMds.ini	Initialization file created by OptoServer Administrator when it is exited for the first time
OptoMwd.dll	File in the system directory necessary for communication with ports
Mds.exe	OptoServer executable program file used to communicate to OPC-compliant and DDE-aware clients
Mdshelp.hlp	Help file for OptoServer
OptoSa.exe	OptoServer Administrator executable program file
Readme.txt	Latest readme file for this release

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